The United Republic of Tanzania

Tanzania Civil Aviation Authority

Aircraft Maintenance Engineers' Licence Manual

Foreword

The purpose of this Aircraft Maintenance Engineers' Licence (AMEL) Manual is to provide technical guidance to Approved Maintenance Training Organizations, Aircraft Maintenance Training Organizations, Approved Maintenance Organizations (AMO) and Aircraft Maintenance Engineers, and technicians.

The procedures in this manual provide guidance on how to meet the requirements of the Civil Aviation (Personnel Licensing) Regulations in force. All applicants for Aircraft Maintenance Engineers' Licence (AMEL), ratings or specialized authorizations issued by the Authority shall comply with the requirements specified in this manual. An applicant shall, before being issued with AMEL, rating or speciliazed authorization, meet such requirements as specified for that licence, rating or speciliazed authorization.

Changes in aviation technology, Civil Aviation Act or specific operating regulations within the industry may necessitate changes to the requirements in this manual. Therefore, the document may be amended from time to time. This manual includes references to regulations and relevant technical guidance materials

All comments and recommendations for revision/amendment action to this publication should be forwarded to:

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Applicability

The requirements contained in this Manual are applicable to;

a) Approved Aircraft Maintenance Training Organizations
b) Aircraft Maintenance Training Organizations
c) Approved Maintenance Organizations.
d) Aircraft Maintenance Personnel.

Manual Organization

This Manual is divided in three parts;

PART I - Personnel Licensing requirements for Aircraft Maintenance Engineers' Licence
a) Section A - Technical Requirements
b) Section B - AMEL Examination Procedures Manual (TCAA-MAN-AME-PEL03)
c) Section C- Appendices to Technical Requirements
d) Section D - Appendices to Acceptable Means of Compliance

PART II- General Provisions and the Requirements to render valid an Aircraft Maintenance Engineers' Licence and/or Ratings issued by a contracting state

a) Conversion of Foreign AMEL
b) Validation of Foreign AMEL

PART III - Component and Specialized Maintenance Specialists Authorization

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RECORD OF REVISIONS

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KEY TO USE THE DOCUMENT

AMEL.A.4 Licence Categories (a). Aircraft Maintenance Engineers' Licences includes -Category A -Category B1 -Category B2 -Category B3 -Category C (b). Categories A and B1 are subdivided into subcategories relative to combination of aeroplanes, helicopters, and piston engines. The subcategories are -A1 and B1.1 Aeroplane Turbines -A2 and B1.2 Aeroplane Piston -A3 and B1.3 Helicopters Turbine -A4 and B1.4 Helicopters Piston	**Implementing Rule – (Regulation Requirement)**
AMC AMEL.A.123 Application 1. Applied maintenance experience should be written up in a manner that the reader has a reasonable understanding of where, when and what maintenance constitutes the experience. A task by task account is not necessary but at the same time a general statement "X years maintenance experience completed" is not acceptable. Aircraft Maintenance Engineers' Logbook – TCAA(L)85(section 3.1) of maintenance experience is required by the Authority and it is acceptable to cross-refer to other documents containing information on maintenance experience. 2. Applicants claiming the maximum reduction in total experience specified in the Civil Aviation (Personnel Licensing) regulation based upon having successfully completed approved basic training should include the approved training organization certificate of recognition for approved basic training.	**AMC – Acceptable means of compliance.**
GM AMEL.A.128(a) Privileges 1. The following definitions apply: Electrical system means the aircraft electrical power supply source, plus the distribution system to the different components contained in the relevant connectors. Lighting systems are also included in this definition. When working on cables and connectors, which are part of these electrical systems, the following typical practices are included in the privileges: • Continuity insulation and bonding techniques and testing; • Crimping and testing of crimped joints; • Connector pin removal and insertion; • Wiring protection techniques	**GM - Guidance Material**

PART I

Personnel Licensing Requirements for Aircraft Maintenance Engineers' Licence

SECTION A - TECHNICAL REQUIREMENTS

AMEL.A.1 Scope
This section defines the Aircraft Maintenance Engineers' Licence and establishes the requirements for application, issue, and continuation of its validity.

AMEL.A.2a Definitions
Within the scope of the Civil Aviation (Personnel Licencing) Regulations, the following definitions shall apply:

(a) "aeroplane" means a power-driven heavier-than- air aircraft deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight;
(b) "aircraft" means any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface;
(c) "Aircraft — type of" means all aircraft of the same basic design including all modifications thereto except those modifications which result in a change in handling or flight characteristics;
(d) "Aircraft maintenance personnel"- means persons who perform, supervise, inspect or certify maintenance of an aircraft, aircraft engine, propeller, appliance or component. This includes holders of an aircraft maintenance licence issued under these Regulations, and persons authorised by an approved maintenance organisation or an operator to carry out such work.
(e) "certifying staff" means personnel responsible for the release of an aircraft, an engine or a component after maintenance;
(f) "Authority" means the Tanzania Civil Aviation Authority;
(g) "component" means any engine, propeller, part or appliance;
(h) "Continuing airworthiness" means all of the processes ensuring that, at any time in its operating life, the aircraft complies with the airworthiness requirements in force and is in a condition for safe operation;
(i) "Contracting State" means a State that is signatory to the Convention on International Civil Aviation Organization (Chicago Convention);
(j) "Large aircraft" means an aircraft, classified as an aeroplane with a maximum take-off mass of more than 5700 kg, or a multi-engine helicopter;
(k) "Complex motor-powered aircraft (CMPA) means:
  i) an aeroplane: − with a maximum certificated take-off mass exceeding 5 700 kg, or − certificated for a maximum passenger seating configuration of more than nineteen, or −

certificated for operation with a minimum crew of at least two pilots, or − equipped with (a) turbojet engine(s) or more than one turboprop engine, or

ii) a helicopter certificated: − for a maximum take-off mass exceeding 3 175 kg, or − for a maximum passenger seating configuration of more than nine, or − for operation with a minimum crew of at least two pilots, or

iii) a tilt rotor aircraft;

(l) "maintenance" means the performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair;

(m) "Pre-flight inspection" means the inspection carried out before flight to ensure that the aircraft is fit for the intended flight.

(n) "Rendering (a licence) valid (Validation)" means the action taken by a Contracting State, as an alternative to issuing its own licence, in accepting a licence issued by any other Contracting State as the equivalent of its own licence;

(o) "Support Staff" means those staff holding AMEL in category B1, B2 and/or B3 with appropriate aircraft ratings, working in a base maintenance environment while not necessarily holding certification privileges.

AMEL.A.2b Abbreviation

AMEL	Aircraft Maintenance Engineers' Licence
AD	Airworthiness Directive
AMP	Aircraft Maintenance Personnel
AMC	Acceptable Means of Compliance
AMEL	Tanzania Aircraft Maintenance Licence
TCAA	Tanzania Civil Aviation Authority
IMA	Integrated Modular Avionics
CMC	Central Maintenance Computer
GM	Guidance Instructions
SB	Service Bulletin
CAA	Civil Aviation Authority
AMO	Approved Maintenance Organization
ATA	Air Transport Association
OJT	On-the-Job Training
TC	Type Certificate
TCDS	Type Certificate Data Sheet
PEL	Personnel Licensing
AOC	Air Operator Certificate
ATO	Approved Training Organisation
MEL	Minimum Equipment List
MMEL	Master Minimum Equipment List
MTOM	Maximum Certificated Take-off Mass
CDL	Configuration Deviation List
ETOPS	Extended-range Twin-engine Operational Performance Standards
EDTO	Extended Diversion Time Operations
MBT	Multimedia Based Training
APU	Auxiliary Power Unit
SRM	Structural Repair Manual
TSM	Trouble Shooting Manual
AFM	Aircraft Flight Manual
WD	Wiring Diagram
MPD	Maintenance Planning Document
MRB	Maintenance Review Board
ALI	Airworthiness Limitation Items
ICA	Instructions for Continuing Airworthiness
FTS	Fuel Tank Safety

RVSM	Reduced Vertical Separation Minima
CDCCL	Critical Design Configuration Control Limitations
CMR	Certification Maintenance Requirements
SRM	Structural Repair Manual
NVIS	Night Vision Imaging Systems
STD	Simulation Training Device
CBT	Competency-Based Training
TNA	Training Needs Assessment
EASA	European Union Aviation Safety Agency
SAS	Specific Airworthiness Specifications
FLVC	Foreign Licence Validation Certificate
MSTD	Maintenance Simulation Training Device
MTD	Maintenance Training Device

AMEL.A.5 Licence Categories

(a) Aircraft Maintenance Engineers' Licences includes:
- i) Category A
- ii) Category B1
- iii) Category B2
- iv) Category B3
- v) Category C

(b) Categories A and B1 are subdivided into subcategories relative to combinations of aeroplanes, helicopters, turbine and piston engines. The subcategories are:

- i) A1 and B1.1 Aeroplanes Turbine
- ii) A2 and B1.2 Aeroplane Piston
- iii) A3 and B1.3 Helicopters Turbine
- iv) A4 and B1.4 Helicopters Piston

(c) Category B3 is applicable to piston-engine non-pressurized aeroplanes of 2000 Kg MTOM and below.

GM AMEL.A.4 Licence Categories

Note: Individual Aircraft Maintenance Engineers' Licence holders need not be restricted to a single category; provided that each qualification requirement is satisfied, any combination of categories may be granted.

AMEL.A.4 Aircraft Groups

For the purpose of ratings on Aircraft Maintenance Engineers' Licences, aircraft shall be classified in the following groups:

Group 1: Complex motor-powered aircraft as well as multiple-engine helicopters, aeroplanes with maximum certified operating altitude exceeding FL290, aircraft equipped with fly-by-wire systems and other aircraft requiring an aircraft type rating when defined so by the Authority.

Group 2: Aircraft other than those in Group 1 belonging to the following subgroups:
- Sub-group 2a: Single turbo-propeller engine aeroplanes
- Sub-group 2b: Single turbine engine helicopters
- Sub-group 2c: Single piston engine helicopters

Group 3: Piston engine aeroplanes other than those in Group 1.

AMEL. A.123 Application

(a) An application for an aircraft maintenance engineers' license or change to such license shall be made on TCAA Form TCAA-AC-PEL013 in a manner established by the Authority and submitted thereto.
(b) Reserved
(c) In addition to the documents required in point AMEL.A.123 (a), as appropriate, the applicant for additional basic categories or subcategories to an Aircraft Maintenance Engineers' Licence shall submit his/her current original Aircraft Maintenance Engineers' Licence to the Authority together with application form.
(d) Reserved
(e) Reserved
(f) Each application shall be supported by documentation to demonstrate compliance with the applicable theoretical knowledge, practical maintenance skill and applied maintenance experience requirements at the time of application.

AMC AMEL.A.123 Application

1. Applied maintenance experience should be written up in a manner that the reader has a reasonable understanding of where, when and what maintenance constitutes the experience. A task-by- task account is not necessary but at the same time a general statement "X year's maintenance experience completed" is not acceptable. Aircraft Maintenance Engineer's Logbook of maintenance experience is required by the Authority and it is accepted to cross-refer to other documents containing information on maintenance experience.

2. Applicants claiming the maximum reduction in total experience specified in the Civil Aviation (Personnel Licensing) Regulations based upon having successfully completed approved basic training (Ab-Initio) should include the approved training organization certificate of recognition for approved basic training.

3. Applicants claiming reduction in total experience specified in AMEL.A.125 based upon having successfully completed technical training in an organisation or institute recognised by the Authority as a competent organisation or institute should include the relevant certificate of successful completion of training.

AMEL. A.123 Eligibility

An applicant for an aircraft maintenance engineers' licence shall;

(a) be at least eighteen years of age;

(b) demonstrate the ability to read, speak, write, and understand the English language, interpret technical reports and maintenance publications and carry out technical discussions in the English language;

(c) comply with the knowledge, experience and competency requirements prescribed for the rating sought;

(d) pass all of the prescribed examinations for the rating sought, within twelve months preceding the date of filing the application; and

(e) have technical background knowledge related to science subjects in Mathematics, physics.

AMEL. A.128 Privileges

(a) The following privileges shall apply:

1. A category A Aircraft Maintenance Engineers' Licence permits the holder to issue certificates of release to service following minor scheduled line maintenance and simple defect rectification within the limits of tasks specifically endorsed on the certification

authorisation referred to in Civil Aviation (Approved Maintenance Organization) Regulations. The certification privileges shall be restricted to work that the licence holder has personally performed in the maintenance organisation that issued the certification authorisation.

2. A category B1 Aircraft Maintenance Engineers' Licence shall permit the holder to issue certificates of release to service and to act as B1 support staff f o r t h e following:

a) Maintenance performed on aircraft structure, powerplant, mechanical and electrical systems.

b) Work on avionic systems requiring only simple tests to prove their serviceability and not requiring troubleshooting.
Category B1 includes the corresponding A subcategory.

3. A category B2 Aircraft Maintenance Engineers' Licence shall permit the holder, to issue certificates of release to service and to act as B2 support staff for the following:

(a) Maintenance performed on avionic and electrical systems

(b) Electrical and avionics tasks within powerplant and mechanical systems, requiring only simple tests to prove their serviceability; and

minor scheduled line maintenance and simple defect rectification within the limits of tasks specifically endorsed on the certification authorization referred to in Civil Aviation (Approved Maintenance Organization) Regulations as amended. This certification privilege shall be restricted to work that the licence holder has personally performed in the maintenance organisation which issued the certification authorization, and limited to the ratings already endorsed in the B2 licence.

The category B2 licence does not include any A subcategory.

4. A category B3 aircraft maintenance engineers' licence shall permit the holder to issue certificates of release to service and to act as B3 support staff for:

(a) Maintenance performed on aeroplane structure, powerplant and mechanical and electrical systems.

(b) Work on avionic systems requiring only simple tests to prove their serviceability and not requiring troubleshooting.

5. A category C aircraft maintenance engineers' licence shall permit the holder to issue certificates of release to service following base maintenance on aircraft. The privileges apply to the aircraft in its entirety.

6. The holder of an Aircraft Maintenance Engineers' Licence may not exercise certification privileges unless:

(a) In compliance with the applicable requirements of the Civil Aviation (Approved Maintenance Organization) Regulations.

(b) In the preceding two-year period, he/she has either had six months of maintenance experience in accordance with the privileges granted by the aircraft maintenance engineers licence, or met the provision for the issue of the appropriate privileges;

(c) He/she has the adequate competence to certify maintenance on the corresponding aircraft; and

(d) He/she is able to read, write and communicate to an understandable level in the language(s) in which the technical documentation and procedures necessary to support the issue of the certificate of release to service are written.

GM AMEL.A.128 (a) Privileges

The following definitions apply:
Electrical system means the aircraft electrical power supply source, plus the distribution system to the different components contained in the aircraft and relevant connectors. Lighting systems are also included in this definition. When working on cables and connectors, which are part of these electrical systems, the following typical practices are included in the privileges:

- Continuity, insulation and bonding techniques and testing;
- Crimping and testing of crimped joints;
- Connector pin removal and insertion;
- Wiring protection techniques.

Avionics system means an aircraft system that transfers, processes, displays, or stores analogue or digital data using data lines, data buses, coaxial cables, wireless or other data transmission medium,

and includes the system's components and connectors. Examples of avionics systems include the following:

- Auto flight;
- Communication, Radar, and Navigation;
- Instruments (see NOTE below);
- In-Flight Entertainment Systems;
- Integrated Modular Avionics (IMA);
- On-Board Maintenance Systems;
- Information Systems;
- Fly-by-Wire Systems (related to ATA27 "Flight Controls"); where applicable.
- Fibre Optic Control Systems where applicable

NOTE: Instruments are formally included within the privileges of the B2 licence holders. However, maintenance on electromechanical and pitot-static components may also be released by a B1 license holder.

Simple test means a test described in approved maintenance data and meeting all the following criteria:

- The serviceability of the system can be verified using aircraft controls, switches, Built-in Test Equipment (BITE), Central Maintenance Computer (CMC) or external test equipment not involving special training.

- The outcome of the test is a unique go – no-go indication or parameter, which can be a single value or a value within an interval tolerance. No interpretation of the test result or interdependence of different values is allowed.
- The test does not involve more than 10 actions as described in the approved maintenance data (not including those required to configure the aircraft prior to the test, i.e., jacking, flaps down etc, or to return the aircraft to its initial configuration). Pushing a control, switch or button, and reading the corresponding outcome, may be considered as a single step even if the maintenance data shows them separated.

Troubleshooting means the procedures and actions necessary, using approved maintenance data, in order to identify the root cause of a defect or malfunction. It may include the use of BITE or external test equipment.

Line maintenance means any maintenance that is carried out before flight to ensure that the aircraft is fit for the intended flight. It may include:

a. Troubleshooting;
b. Defect rectification;
c. Component replacement with use of external test equipment if required. Component replacement may include components such as engines and propellers;
d. Scheduled maintenance and/or checks including visual inspections that will detect obvious unsatisfactory conditions/discrepancies but do not require extensive in-depth inspection. It may also include internal structure, systems and powerplant items which are visible through quick-opening access panels/doors;
e. Minor repairs and modifications, which do not require extensive disassembly and can be accomplished by simple means;
f. For temporary or occasional cases (Airworthiness Directives, hereinafter AD; service bulletins, hereinafter SB) the quality manager may accept base maintenance tasks to be performed by a line maintenance organisation provided all requirements are fulfilled. Prior Authority's approval will be required for the conditions under which these tasks may be performed.

Base Maintenance means any task falling outside the criteria that are given above for Line Maintenance.

NOTE 1:
Aircraft maintained in accordance with "progressive" type programmes need to be individually assessed in relation to this paragraph. In principle, the decision to allow some "progressive" checks to be carried out is determined by the assessment that all tasks within the particular check can be carried out safely to the required standards at the designated line maintenance station

NOTE 2:
The category B3 licence does not include any A subcategory. Nevertheless, this does not prevent the B3 licence holder from releasing maintenance tasks typical of the A2 subcategory for piston- engine non-pressurized aeroplanes of 2000 Kg MTOM and below, within the limitations contained in the B3 licence.

NOTE 3:
The category C licence permits certification of scheduled base maintenance by the issue of a single certificate of release to service for the complete aircraft after the completion of all such maintenance. The basis for this certification is that the maintenance has been carried out by competent licenced engineers/technicians, and category B1, B2 and B3 certifying staff, as appropriate, have signed for the maintenance tasks under their respective specialization. The

principal function of the category C certifying staff is to ensure that all required maintenance has been called up and signed off by the category B1, B2 and B3 certifying staff, as appropriate, before issue of the certificate of release to service. Only category C personnel who also hold category B1, B2 and B3 qualifications may perform both roles in base maintenance.

AMC AMEL.A.128 (b) 2 Privileges

The 6 months maintenance experience in 2 years should be understood as consisting of two elements; *duration and nature of the experience*. The minimum to meet the requirements for these elements may vary depending on the size and complexity of the aircraft and type of operation and maintenance.

a) Duration:

Within an approved maintenance organization:

i) 6 months continuous employment within the same organisation; or

ii) 6 months split up into different blocks, employed within the same or in different organisations.

Note: The 6 months period can be replaced by 100 days of maintenance experience in accordance with the privileges, whether they have been performed within an approved organization.

b) Nature of the experience:

Depending on the category of the Aircraft Maintenance Engineers' Licence, the following activities are considered relevant for maintenance experience:

i) Servicing;
ii) Inspection;
iii) Operational and functional testing
iv) Troubleshooting;
v) Repairing;
vi) Modifying;
vii) Changing components;
viii) Supervising these activities;
ix) Releasing aircraft to service.

For *category A* licence holder, the experience should include exercising the privileges, by means of performing tasks related to the authorization, on at least one aircraft type for each licence subcategory including servicing, component changes and simple defect rectifications.

For *category B1*, B2 and B3 for every aircraft included in the authorization, the experience should be on that particular aircraft or on a similar aircraft within the same license (sub)- category. Two aircraft can be considered as similar when they have similar technology, construction and comparable systems, which means equally equipped with the following (as applicable to the license category):

- Propulsion systems (piston, turboprop, turbofan, turbo-shaft, jet-engine or push/puller propellers); and
- Flight control systems (only mechanical controls, hydro-mechanically powered controls or electro-mechanically powered controls); and
- Avionic systems (analogue systems or digital systems); and
- Structure (manufactured of metal, composite or wood).

For licenses endorsed with (sub) group ratings:

- In the case of B1 license endorsed with (sub)group ratings (either manufacturer subgroup or full (sub) group) as defined in AMEL.A.126, the holder should show experience on at least one aircraft type per (sub) group and per aircraft structure (metal, composite, wood).
- In the case of a B2 licence endorsed with (sub) group ratings (either manufacturer subgroup or full (sub) group) as defined in AMEL.A.126, the holder should show experience on at least one aircraft type per (sub) group.
- In the case of a B3 licence endorsed with the rating "piston-engine non-pressurized Aeroplanes of 2000kg MTOM and below" as defined in AMEL.A.126, the holder should show experience on at least one aircraft type per aircraft structure (metal, composite, wooden).

For *category C*, the experience should cover at least one of the aircraft types endorsed on the licence.

For a combination of categories, the experience should include some activities of the nature shown in paragraph 2 in each category.

A maximum of 20% of the experience duration required may be replaced by the following relevant activities on an aircraft type of similar technology, construction and with comparable systems:

- Aircraft maintenance related training as an instructor/assessor or as a student;
- Maintenance technical support/engineering;

- Maintenance management/planning.

Applied maintenance experience should be documented in an individual logbook or in any other recording system (which may be an automated one) containing the following data:

- Date;
- Aircraft type;
- Aircraft identification i.e., registration;
- ATA chapter
- Base/line task details e.g., 100 FH check, MLG wheel change, engine oil check and complement, SB embodiment, troubleshooting, structural repair, STC embodiment, etc.; Category used A, B1, B2, B3 or C.

GM AMEL.A.128 (b) 2 Privileges

The sentence *"met the provision for the issue of the appropriate privileges"* means that during the previous 2 years, the person has met all the requirements for the endorsement of the corresponding aircraft rating (for example, in the case of aircraft in Group 1, theoretical plus practical element plus, if applicable, on- the-job training). This supersedes the need for 6 months of experience for the first 2 years. However, the requirement of 6 months of experience in the preceding 2 years will need to be met after the second year.

AMC AMEL.A.128 (b) 3 Privileges

The wording *"has the adequate competence to certify maintenance on the corresponding aircraft"* means that the licence holder, and if applicable, the organisation where he/she is contracted/employed, should ensure that he/she has acquired the appropriate knowledge, skills, attitude and experience to release the aircraft being maintained. This is essential because some systems and technology present in the particular aircraft being maintained may not have been covered by the training/examination/experience required to obtain the licence and ratings.

This is typically the case, among others, in the following situations:

- Type ratings which have been endorsed on a licence in accordance with Appendix I of this manual "List of Type Ratings" after attending type training/on-the-job training which did not cover all the models/variants included in such rating. For example, a licence endorsed with the rating Airbus A318/A319/A320/A321 (CFM56) after attending type training/on-the-job training covering only the Airbus A320 (CFM56).

- Type ratings which have been endorsed on a licence in accordance with Appendix I of this manual "List of Type Ratings" after a new variant has been added to the rating in Appendix I, without performing difference training. For example, a licence endorsed with the rating Boeing 737- 600/700/800/900 for a person who already had the rating Boeing 737-600/700/800, without performing any difference training for the 737-900.

- Work being carried out on a model/variant for which the technical design and maintenance techniques have significantly evolved from the original model used in the type training/on the-job training.

- Specific technology and options selected by each customer, which may not have been covered by the type training/on-the-job training.

- Changes in the basic knowledge requirements of Appendix I to this manual not requiring re-examination of existing licence holders (grandfathered privileges).

- The endorsement of group/subgroup ratings based on experience on a representative number of tasks/aircraft or based on type training/examination on a representative number of aircraft.
- Persons meeting the requirements of 6 months of experience every 2 years only on certain similar aircraft types as allowed by Civil Aviation (Personnel Licensing) regulations as amended.
- Persons holding a licence with limitations, obtained through conversion of the requirements of the Civil Aviation (Personnel Licensing) regulations as amended where such limitations are going to be lifted after performing the corresponding basic knowledge examinations. In this case, the type ratings endorsed in the licence may have been obtained in the national system without covering all the aircraft systems (because of the previous limitations) and there will be a need to assess and, if applicable, to train this person on the missing systems.

GM AMEL.A.128 (b) 4 Privileges

1. Holders of aircraft maintenance engineers' licence may not exercise certification privileges unless they have a general knowledge of the language used within the maintenance environment including knowledge of common aeronautical terms in the language. The level of knowledge should be such that the licence holder is able to:

    - Read and understand the instructions and technical manuals used for the performance of maintenance;

- Make written technical entries and any maintenance documentation entries, which can be understood by those with whom they are normally required to communicate;
- Read and understand the maintenance organisation procedures;
- Communicate at such a level as to prevent any misunderstanding when exercising certification privileges.

2. In all cases, the level of understanding should be compatible with the level of certification privileges exercised.

AMEL.A.124 Basic knowledge requirements

(a) An applicant for an Aircraft Maintenance Engineers' Licence, or the addition of a category or subcategory to such a licence, shall demonstrate by examination a level of knowledge in the appropriate subject modules in accordance with Appendix I of this manual. The examination shall be conducted by the Authority.

(b) The training courses and examinations shall be passed within ten years prior to the application for an aircraft maintenance licence or the addition of a category or subcategory to such Aircraft Maintenance Engineers' Licence. Should this not be the case, examination credits may however be obtained in accordance with point (c).

(c) The applicant may apply to the Authority for full or partial examination credit to the basic knowledge requirements for:

i) Basic knowledge examinations that do not meet the requirement described in point (b) above; and

ii) Any other technical qualification considered by the competent authority to be equivalent to the knowledge requirements of this manual.

Credits shall be granted in accordance with Subpart E of TCAA AMEL procedures manual.

(d) Credits expire ten years after they were granted to the applicant by the Authority. The applicant may apply for new credits after expiration.

(e) The 10 years' validity requirement applies to each individual module examination, except for those module examinations which were already passed as part of another licence category and the licence has already been issued.

AMC AMEL.A.124 Basic knowledge requirements

1. For an applicant being a person qualified by holding an academic degree in an aeronautical, mechanical, or electronic discipline from a recognised university or other higher educational institute, the examination will depend upon the course taken in relation to Appendix I to this manual.

2. Knowledge gained and examinations passed during previous experiences, for example in military aviation and civilian apprenticeships, will be credited where the Authority is satisfied that such knowledge and examinations are equivalent to that required by Civil Aviation (Personnel Licensing) regulations as amended.

GMAMEL.A.124 (a) Basic Knowledge Requirements

The levels of knowledge for each licence (sub)-category are directly related to the complexity of the certifications related to the corresponding licence (sub)-category; which means that category A should demonstrate a limited but adequate level of knowledge, whereas category B1, B2 and B3 should demonstrate a complete level of knowledge in the appropriate subject modules.

AMEL.A.125 Basic Applied Maintenance Experience requirements

(a) An applicant for an Aircraft Maintenance Engineers' Licence shall have acquired:

1. For category A, subcategories B1.2, B1.4. and B3:

(i) Four years of practical maintenance experience on operating aircraft, if the applicant has no previous relevant technical training; or

(ii) Three years of practical maintenance experience on operating aircraft and completion of training considered relevant by the Authority as a skilled worker, in a technical trade; or

(iii)Two years of practical maintenance experience on operating aircraft and completion of a basic training course approved in accordance with Civil Aviation (Approved Training Organization) regulations.

2. For category B2 and subcategories B1.1 and B1.3:

(i) Five years of practical maintenance experience on operating aircraft if the applicant has no previous relevant technical training; or

(ii) Four years of practical maintenance experience on operating aircraft and completion of training conducted by a non-approved training organization, but considered relevant by the Authority, as a skilled worker in a technical trade; or

(iii)Two years of practical maintenance experience on operating aircraft and completion of a basic training course approved in accordance with Civil Aviation (Approved Training Organization) regulations

3. For category C with respect to large aircraft:

(i) Three years of experience in exercising category B1.1, B1.3 or B2 privileges as support staff, or both support staff and certifying staff on large aircraft in an AMO including one year of experience as base maintenance support staff; or

(ii) Five years of experience in exercising category B1.2 or B1.4 privileges as support staff, or both support staff and certifying staff on large aircraft in an AMO including one year of experience as base maintenance support staff; or

(iii)To extend the endorsed category C with respect to non-large aircraft to large aircraft, the applicant will have two years of experience in exercising category B1.1, B1.2, B1.3, B1.4, or B2 privileges as support staff, or both support staff and certifying staff, in an AMO operating large aircraft, including 6 months of experience as base maintenance support staff.

4. For category C with respect to non-large aircraft, the applicant will have three years of experience in exercising category B1.1, B1.3 or B2 privileges as support staff, or both support staff and certifying staff on large aircraft in an AMO including six months of experience as base maintenance support staff

(b) An applicant for an extension to an aircraft maintenance licence shall have a minimum civil aircraft maintenance experience requirement appropriate to the additional category or subcategory of licence applied for as defined in Appendix IV of this manual.

(c) The experience shall be practical and involve a representative cross-section of maintenance tasks on aircraft covering all applicable ATA chapters.

(d) At least one year of the required experience shall be recent practical maintenance experience on aircraft of the category/subcategory for which the initial aircraft maintenance licence is sought. For subsequent category/subcategory additions to an existing aircraft maintenance licence, the additional recent maintenance experience required may be less than one year but shall be at least three months. The required experience shall be dependent upon the difference between the licence category/subcategory held and applied for. Such additional practical maintenance experience shall be typical of the new licence category/subcategory sought.

(e) Notwithstanding paragraph (a), aircraft maintenance experience gained outside a civil aircraft maintenance environment shall be accepted when such maintenance is equivalent to that required by this manual as established by the Authority. Additional experience of civil aircraft maintenance shall, however, be required to ensure adequate understanding of the civil aircraft maintenance environment.

(f) Serving members of the Military with a minimum of ten years' service who meet all the other requirements as per this manual, and recommended by the base commander/Technical officer, are eligible to apply for an Aircraft Maintenance Engineers' Licence.

(g) Experience required in (e) above shall have been acquired within the ten years preceding the application for an Aircraft Maintenance Engineers' Licence or the addition of a category or subcategory to such a licence.

AMC AMEL.A.125 (a) Basic experience requirements

1. A skilled worker is a person who has successfully completed a training acceptable to the Authority, involving the manufacture, repair, overhaul or inspection of mechanical, electrical or electronic equipment. The training would include the use of tools and measuring devices.
2. Maintenance experience on operating aircraft:
   - Means the experience of being involved in maintenance tasks on aircraft, which are being operated, by airlines, air operators, owners, etc.;
   - Should cover a wide range of tasks in length, complexity and variety;
   - Aims at gaining sufficient experience in the real environment of maintenance as opposed to only the training school environment;
   - May be gained within different maintenance organizations or under the supervision of independent certifying staff;
   - May be combined with approved training organization so that periods of training can be intermixed with periods of experience, like an apprenticeship.

AMC AMEL.A.125 (d) Basic experience requirements

To be considered as recent experience; at least 50% of the required 12-month recent experience should be gained within the 12-month period prior to the date of application for the Aircraft Maintenance Engineers' Licence. The remainder of the recent experience should have been gained within the 7-year period prior to application. It must be noted that the rest of the basic experience required by AMEL.A.125 must be obtained within the 10 years prior to the application as required by AMEL.A.125 (g).

AMC AMEL.A.125 (e) Basic experience requirements

(a) If the Authority has established that the experience gained outside an aircraft maintenance organisation approved in accordance with the Civil Aviation (Approved Maintenance Organization) Regulations is equivalent to that required by AMEL, the minimum additional experience in aircraft maintenance organisation(s) that is (are) approved in accordance with the Civil Aviation (Approved Maintenance Organization) Regulations is should be:

1. For category "A" the additional experience of civil aircraft maintenance should be a minimum of 6 months.
2. For category B1, B2 or B3 the additional experience of civil aircraft maintenance should be a minimum of 12 months.

Aircraft maintenance experience gained outside a civil aircraft maintenance environment may include aircraft maintenance experience gained in state/military aircrafts, police etc. or in aircraft manufacturing organizations.

AMEL.A.129 Continued validity of the Aircraft Maintenance Engineers' Licence

(a) The aircraft maintenance engineer's licence becomes invalid after the duration defined in the licence.

(b) The holder of an aircraft maintenance engineer's licence shall complete the relevant parts of Form: TCAA-AC-PEL013 (see Appendix V) and submit it with the holder's original licence to the Authority, unless the holder works in an approved maintenance organisation that has an approved procedure in its maintenance procedures manual whereby such organisation may submit the necessary documentation in coordination with the aircraft maintenance licence engineer's holder.

(c) Any certification privilege based upon an Aircraft Maintenance Engineers' Licence becomes invalid as soon as the Aircraft Maintenance Engineers' Licence is invalid.

(d) The Aircraft Maintenance Engineers' Licence is only valid,

(i) when issued and/or changed by the Authority and

(ii) when the holder has signed the Licence (This requirement will be indicated on the licence issue/renewal forwarding letter.)

GM AMEL.A.129 Continued validity of the Aircraft Maintenance Engineers' Licence

The validity of the Aircraft Maintenance Engineers' Licence is not affected by recency of maintenance experience whereas the validity of the licence privileges is affected by maintenance experience as specified in the AMEL. A.128 (a).

AMEL. A.126 Endorsement with aircraft ratings

1) In order to be entitled to exercise certification privileges on a specific aircraft type, the holder of an Aircraft Maintenance Engineers' Licence needs to have his/her licence endorsed with the relevant aircraft ratings.

a) For category B1, B2, or C the relevant aircraft ratings are as follows:

i) For group 1 aircraft, the appropriate aircraft type rating.

ii) For group 2 aircraft, the appropriate aircraft type rating, manufacturer sub-group rating or full sub-group rating.

iii) For group 3 aircraft, the appropriate aircraft type rating or full group rating.

For category B3, the relevant rating is "piston-engine non-pressurized aeroplanes of 2000 Kg MTOM and below".

b) For category A, no rating is required, it is subject to compliance with the requirements of the Approved Maintenance Organization.

2) The endorsement of aircraft type ratings requires the satisfactory completion of the relevant category B1, B2 or C aircraft type training.

3) In addition to the requirement of point (b), the endorsement of the first aircraft type rating within a given category/sub-category requires satisfactory completion of the corresponding On-the-Job Training, as described in Appendix III to this manual.

4) By derogation from points (b) and (c), for group 2 and 3 aircraft, aircraft type ratings may also be granted after:

i) Satisfactory completion of the relevant category B1, B2 or C aircraft type examination described in Appendix III of this manual, and

ii) In the case of B1 and B2 category, demonstration of practical experience on the aircraft type. In that case, the practical experience shall include a representative cross section of maintenance activities relevant to the licence category.

5) For group 2 aircraft:

a) The endorsement of manufacturer sub-group ratings for category B1 and C licence holders requires complying with the aircraft type rating requirements of at least two aircraft types from the same manufacturer which combined are representative of the applicable manufacturer sub-group;

b) The endorsement of full sub-group ratings for category B1 and C licence holders requires complying with the aircraft type rating requirements of at least three aircraft types from different manufacturers which combined are representative of the applicable sub-group;

c) The endorsement of manufacturer sub-groups and full sub-group ratings for category B2 licence holders requires demonstration of practical experience, which shall include a representative cross-section of maintenance activities relevant to the licence category and to the applicable aircraft sub-group.

d) By derogation from point (e)(3), the holder of a B2 licence, endorsed with a full subgroup 2b, is entitled to be endorsed with a full subgroup 2c.

6) For group 3 aircraft:

a) The endorsement of the full group 3 rating for category B1, B2 and C licence holders requires demonstration of practical experience, which shall include a representative cross section of maintenance activities relevant to the licence category and to the group 3.

b) For category B1, unless the applicant provides evidence of appropriate experience, the group 3 rating shall be subjected to the following limitations, which shall be endorsed on the licence:

i) Pressurized aeroplanes
ii) Metal structure aeroplanes
iii) Composite structure aeroplanes
iv) Wooden structure aeroplanes
v) Aeroplanes with metal tubing structure covered with fabric.

c) Unless the applicant provides evidence of appropriate experience, the rating referred to in point 1 shall be subject to the following limitations, which shall be endorsed on the licence:

i) Wooden structure aeroplanes
ii) Aeroplanes with metal tubing structure covered with fabric
iii) Metal structure aeroplanes
iv) Composite structure aeroplanes.

d) By derogation from point (f)(1), the holder of a B2 licence, endorsed with a full subgroup 2a or 2b, is entitled to be endorsed with Groups 3.

7) For the B3 licence:

a) The endorsement of the rating "piston-engine non-pressurized aeroplanes of 2000 Kgs MTOM and below" requires demonstration of practical experience, which shall include a representative cross-section of maintenance activities relevant to the licence category.

b) Unless the applicant provides evidence of appropriate experience, the rating referred to in point 1 shall be subject to the following limitations, which shall be endorsed on the licence:

i) Wooden structure aeroplanes
ii) Aeroplanes with metal tubing structure covered with fabric
iii) Metal structure aeroplanes
iv) Composite structure aeroplanes

GM AMEL.A.126 (b) Endorsement with aircraft ratings

An aircraft type rating includes all the aircraft models/variants listed in column 4 of Appendix I to AMC to this manual.

When a person already holds a type rating on the licence and such type rating is amended in the Appendix I to AMC to this manual in order to include additional models/variants, there is no need for additional type training for the purpose of amending the type rating in the licence. The rating should be amended to include the new variants, upon request by the applicant, without additional requirements. However, it is the responsibility of the licence holder and, if applicable, the approved maintenance organisation where he/she is employed to comply with AMEL.A.123 (b)3 of this manual and the Civil Aviation (Approved Maintenance Organization) Regulations as amended, before he/she exercises certification privileges.

Similarly, type training courses covering certain, but not all the models/variants included in a type rating, are valid for the purpose of endorsing the full type rating.

AMC AMEL.A.126 (e) Endorsement with aircraft ratings

1. For the granting of manufacturer subgroup ratings for Group 2 aircraft, for B1 and C licence holders, the sentence "at least two aircraft types from the same manufacturer which combined are representative of the applicable manufacturer subgroup" means that the selected aircraft types should cover the technologies relevant to the manufacturer subgroup in the following areas:

   a) Flight control systems (mechanical controls / hydro mechanically powered controls / electromechanically powered controls); and
   b) Avionic systems (analogue systems / digital systems); and
   c) Structure (manufactured of metal / composite / wood).

   In cases where there are very different aircraft types within the same manufacturer subgroup, it may be necessary to cover more than two aircraft types to ensure adequate representation. For this purpose, it may be possible to use aircraft types from the same manufacturer classified in Group 1 as long as the selected aircraft belong to the same licence subcategory for which the rating will be endorsed.

2. For the granting of full subgroup ratings for Group 2 aircraft, for B1 and C licence holders, the sentence *"at least three aircraft types from different manufacturers which combined are representative of the applicable subgroup"* means that the selected aircraft types should cover all the technologies relevant to the manufacturer subgroup in the following areas:

   a) Flight control systems (mechanical controls / hydromechanically powered controls /

electromechanically powered controls); and

b) Avionic systems (analogue systems / digital systems); and

c) Structure (manufactured of metal / composite / wood).

In cases where there are very different aircraft types within the same subgroup, it may be necessary to cover more than three aircraft types to ensure adequate representation. For this purpose, it may be possible to use aircraft types from different manufacturers classified in Group 1 if the selected aircraft belong to the same licence subcategory for which the rating will be endorsed.

3. For manufacturer subgroup ratings, the term *"manufacturer"* means the type certificate (TC) holder defined in the Type certificate data sheet (TCDS), which is reflected in the list of type ratings in Appendix I of AMC to this manual.
   In the case of an aircraft rating where the type rating refers to a TC holder made of a combination of two manufacturers which produce a similar aircraft (i.e., Agusta / Bell Helicopter Textron or any case of aircraft similarly built by another manufacturer) this combination should be considered as one manufacturer.

As a consequence:

i) When a licence holder gets a manufacturer type or a manufacturer subgroup rating made of a combination of manufacturers, it covers the combination of such manufacturers.

ii) When a licence holder who intends to endorse a full subgroup rating selects three aircraft from different manufacturers, this means from different combinations of manufacturers as applicable.

AMC AMEL.A.126 (d), (e) 3, (f) 1 and (g) 1 Endorsement with aircraft ratings

1. The "practical experience" should cover a representative cross section including at least 50% of tasks contained in Appendix II to AMC relevant to the licence category and to the applicable aircraft type ratings or aircraft (sub)-group ratings being endorsed. This experience should cover tasks from each paragraph of the Appendix II list. Other tasks other than those in the Appendix II may be considered as a replacement when they are relevant. In the case of (sub)- group ratings, this experience may be shown by covering one or several aircraft types of the applicable (sub)group and may include experience on aircraft classified in group 1, 2 and/or 3 as long as the experience is relevant. The practical experience should be obtained under the supervision of authorised certifying staff.

2. In the case of endorsement of individual type ratings for Group 2 and Group 3 aircraft, for the second aircraft type of each manufacturer (sub)-group the practical experience should be

reduced to 30% of the tasks contained in Appendix II to AMC relevant to the licence category and to the applicable aircraft type. For subsequent aircraft types of each manufacturer (sub)group this should be reduced to 20%.

3. Practical experience should be demonstrated by the submission of records or a logbook showing the Appendix II tasks performed by the applicant. Typical data to be recorded are similar to those described in AMC AMEL.A.123 (b) 2.

GM AMEL.A.126 Endorsement with aircraft ratings

The following table shows a summary of the aircraft rating requirements contained in AMEL.A.126, AMEL.A.127 and Appendix III to this manual.

The table contains the following:

a) The different aircraft groups.
b) For each licence (sub)-category, which ratings are possible (at the choice of the applicant):
   i) Individual type ratings.
   ii) Full and/or Manufacturer (sub)-group ratings
c) -Qualifications for each rating option.
d) For the B1.2 licence (Group 3 aircraft) and for the B3 licence (piston-engine non-pressurized aeroplanes of 2000 Kg MTOM and below), which are the possible limitations to be included in the licence if not sufficient experience can be demonstrated in those areas.

Note: OJT means "On-the-Job Training" (Appendix III to this manual, Section 6) and is only required for the first aircraft rating in the licence (sub)-category

PART I - Chapter 1-Section A Table
Aircraft Rating Requirements

Aircraft Groups	B1/B3 licence	B2 licence	C licence
Group1 • Complex motor-powered aircraft. • Multiple engine helicopters. • Aeroplanes certified above FL290. • Aircraft equipped with fly-by-wire. • Other aircraft when defined by the rity.	**(For B1)** Individual TYPE RATING Type training: -Theory + examination -Practical + assessment **PLUS** OJT (for first aircraft in licence subcategory)	**Individual TYPE RATING** Type training: -Theory + examination -Practical + assessment **PLUS** OJT (for first aircraft in licence suAuthobcategory)	**Individual TYPE RATING** Type training: -Theory+ examination

Aircraft Groups **Group3**	**(For B1.1, B1.3, B1.4)** **Individual TYPE RATING** (Type training + OJT) or (Type evaluation + practical experience)	**Individual TYPE RATING** (Type training + OJT) or (Type evaluation + practical experience)	**Individual TYPE RATING** type training or Type evaluation
Piston engine aeroplanes (Except those classified in Group 1)	**Full SUBGROUP RATING** (Type training + OJT) or (Type evaluation + practical experience) on at least 3 aircraft representatives of that subgroup	**Full SUBGROUP RATING** based on demonstration of practical experience	**Full SUBGROUP RATING** type training or Type evaluation on at least 3 aircraft representative of that subgroup
Piston engine nonpressurized aeroplanes of 2000 kg MTOM and below	**Manufacturer SUBGROUP RATING** (Type training + OJT) or (Type evaluation + practical experience) on at least 2 aircraft representatives of that manufacturer subgroup	**Manufacturer SUBGROUP RATING** based on demonstration of practical experience	**Manufacturer SUBGROUP RATING** type training or Type evaluation on at least 2 aircraft representatives of that manufacturer subgroup

Aircraft will be grouped as shown in TCAA website; www.tcaa.go.tz

Refer to Appendix I – List of Aircraft Type Ratings (Section D).

AMEL. A.127 Limitations

1. Limitations introduced on an aircraft maintenance engineers' licence are exclusions from the certification privileges and affect the aircraft in its entirety.

2. For limitations referred to in point AMEL.A.126, limitations shall be removed upon:
   a) Demonstration of appropriate experience, or
   b) After a satisfactory practical assessment performed by the Authority.

3. For limitations referred to in the AMEL.A.211, limitations shall be removed upon satisfactory completion of examination on those modules/subjects defined in the applicable conversion report referred to in these AMEL examinations procedures manual

4. AMC AMEL.A.127 (b) Limitations

1. The appropriate experience required to remove the limitations referred in AMEL.A.126 (f) and (g) shall consist of the performance of a variety of tasks appropriate to the limitations under the supervision of authorised certifying staff. This shall include the tasks required by a scheduled annual inspection. Alternatively, this experience may also be gained, if agreed by the Authority, by theoretical and practical training provided by the manufacturer, as long as an assessment is further carried out and recorded by this manufacturer.

2. It may be acceptable to have this experience on just one aircraft type, provided this type is representative of the (sub)-group in relation to the limitation being removed.

3. The application for the limitation removal should be supported by a record of experience signed by the authorised certifying staff or by an assessment signed by the manufacturer after completion of the applicable theoretical and practical training.

AMEL.A.198 Evidence of qualification

Personnel exercising certification privileges as well as support staff shall produce their licence, as evidence of qualification, within 24 hours upon request by the Authority.

AMEL.A.211 Transition Provisions

(a) A holder of a valid AMEL issued under the Civil Aviation (Personnel licencing) Regulations 2017 may be issued with a new aircraft maintenance engineers' licence subject to conditions specified by the Authority. The Authority shall provide guidance on transition in an Aeronautical Information Circular.

Section B
AMEL Examination Procedures Manual

Refer to TCAA-MAN-AME-PEL03 and other associated Technical Guidance Material/documents published by the Authority.

Section C
Appendices to Technical Requirements

Appendix I Basic knowledge requirements

Basic knowledge for categories A, B1, B2 and B3 are indicated by knowledge levels (1, 2 or 3) against each applicable subject. Category C applicants shall meet either the category B1 or the category B2 basic knowledge levels.

The knowledge level indicators are defined on 3 levels as follows:

- **LEVEL 1:** A familiarization with the principal elements of the subject.
  Objectives:
  (a) The applicant should be familiar with the basic elements of the subject.
  (b) The applicant should be able to give a simple description of the whole subject, using common words and examples.
  (c) The applicant should be able to use typical terms.

- **LEVEL 2:** A general knowledge of the theoretical and practical aspects of the subject and an ability to apply that knowledge.

  Objectives:
  The applicant should be able to understand the theoretical fundamentals of the subject.
  (a) The applicant should be able to understand the theoretical fundamentals of the subject.
  (b) The applicant should be able to give a general description of the subject using, as appropriate, typical examples.
  (c) The applicant should be able to use mathematical formulae in conjunction with physical laws describing the subject.
  (d) The applicant should be able to read and understand sketches, drawings and schematics describing the subject.
  (e) The applicant should be able to apply his knowledge in a practical manner using detailed procedures.

- **LEVEL 3:** A detailed knowledge of the theoretical and practical aspects of the subject and a capacity to combine and apply the separate elements of knowledge in a logical and comprehensive manner.
  Objectives:

(a) The applicant should know the theory of the subject and interrelationships with other subjects.
(b) The applicant should be able to give a detailed description of the subject using theoretical fundamentals and specific examples.
(c) The applicant should understand and be able to use mathematical formulae related to the subject.
(d) The applicant should be able to read, understand and prepare sketches, simple drawings and schematics describing the subject.
(e) The applicant should be able to apply his knowledge in a practical manner using manufacturer's instructions.
(f) The applicant should be able to interpret results from various sources and measurements and apply corrective action where appropriate.

Modularization

Qualification on basic subjects for each Aircraft Maintenance Engineers' Licence category or subcategory should be in accordance with the following matrix, where applicable subjects are indicated by an "X":

Subject module	A or B1 aeroplane with:		A or B1 helicopter with:		B2	B3
	Turbine engine(s)	Piston engine(s)	Turbine engine(s)	Piston engine(s)	Avionics	Piston-engine non-pressurised aeroplanes 2000 kg MTOM and below
1	X	X	X	X	X	X
2	X	X	X	X	X	X
3	X	X	X	X	X	X
4	X	X	X	X	X	X
5	X	X	X	X	X	X
6	X	X	X	X	X	X
7	X	X	X	X	X	X
8	X	X	X	X	X	X
9	X	X	X	X	X	X
10	X	X	X	X	X	X
11	X	X				X
12			X	X		
13					X	
14					X	
15	X		X			

16		X		X		X
17	X	X				X

Module 1- Mathematics.

	A	B1	B2	B3
1.1 Arithmetic Arithmetical terms and signs, methods of multiplication and division, fractions and decimals, factors and multiples, weights, measures and conversion factors, ratio and proportion, averages and percentages, areas and volumes, squares, cubes, square and cube roots.	**1**	**2**	**2**	**2**
1.2 Algebra				
a) Evaluating simple algebraic expressions, addition, subtraction, multiplication and division, use of brackets, simple algebraic fractions;	**1**	**2**	**2**	**2**
b) Linear equations and their solutions; Indices and powers, negative and fractional indices; Binary and other applicable numbering systems; Simultaneous equations and second-degree equations with one unknown Logarithms;	**-**	**1**	**1**	**2**
1.3 Geometry				
a) Simple geometrical constructions;	**-**	**1**	**1**	**1**
b) Graphical representation; nature and uses of graphs, graphs of equations/functions;	**2**	**2**	**2**	**2**
c) Simple trigonometry; trigonometrical relationships, use of tables and rectangular and polar co-ordinates	**-**	**2**	**2**	**2**

Module 2: Physics

	Leve			
	A	**B1**	**B2**	**B3**
2.1 Matter Nature of matter: the chemical elements, structure of atoms, molecules; Chemical compounds. States: solid, liquid and gaseous; Changes between states.	**1**	**2**	**2**	**1**
2.2 Mechanics				

2.2.1 *Statics* Forces, moments and couples, representation as vectors; Centre of gravity; Elements of theory of stress, strain and elasticity: tension, compression, shear and torsion; Nature and properties of solid, fluid and gas; Pressure and buoyancy in liquids (barometers).	**1**	**2**	**2**	**1**
2.2.2 *Kinetics* Linear movement: uniform motion in a straight line, motion under constant acceleration (motion under gravity); Rotational movement: uniform circular motion (centrifugal/centripetal forces); Periodic motion: pendular movement; Simple theory of vibration, harmonics and resonance; Velocity ratio, mechanical advantage and efficiency.	**1**	**2**	**2**	**1**
2.2.3 Dynamics a) Mass Force, inertia, work, power, energy (potential, kinetic and total energy), heat, efficiency;	**1**	**2**	**2**	**1**
b) Momentum, conservation of momentum; Impulse; Gyroscopic principles; Friction: nature and effects, coefficient of friction (rolling resistance).	**1**	**2**	**2**	**1**
2.2.4 *Fluid dynamics*				
a) Specific gravity and density;	**2**	**2**	**2**	**2**
b) Viscosity, fluid resistance, effects of streamlining; Effects of compressibility on fluids; Static, dynamic and total pressure: Bernoulli's Theorem, venturi.	**1**	**2**	**1**	**1**
2.3 Thermodynamics				
a) Temperature: thermometers and temperature scales: Celsius, Fahrenheit and Kelvin; Heat definition.	**2**	**2**	**2**	**2**

b) Heat capacity, specific heat; Heat transfer: convection, radiation and conduction; Volumetric expansion; First and second law of thermodynamics; Gases: ideal gases laws; specific heat at constant volume and constant pressure, work done by expanding gas; Isothermal, adiabatic expansion and compression, engine cycles, constant volume and constant pressure, refrigerators and heat pumps; Latent heats of fusion and evaporation, thermal energy, heat of combustion.	-	2	2	-
2.4 Optics (Light) Nature of light; speed of light; Laws of reflection and refraction: reflection at plane surfaces, reflection by spherical mirrors, refraction, lenses; Fibre optics.	-	2	2	-
2.5 Wave Motion and Sound Wave motion: mechanical waves, sinusoidal wave motion, interference phenomena, standing waves; Sound: speed of sound, production of sound, intensity, pitch and quality, Doppler effect.	-	2	2	-

Module 3 - Electrical Fundamentals

	Level			
	A	B1	B2	B3
3.1 Electron Theory Structure and distribution of electrical charges within: atoms, molecules, ions, compounds; Molecular structure of conductors, semiconductors and insulators.	1	1	1	1
3.2 Static Electricity and Conduction Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases and a vacuum.	1	2	2	1
3.3 Electrical Terminology The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.	1	2	2	1
3.4 Generation of Electricity Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.	1	1	1	1

3.5 DC Sources of Electricity Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells; Cells connected in series and parallel; Internal resistance and its effect on a battery; Construction, materials and operation of thermocouples; Operation of photo-cells.	**1**	**2**	**2**	**2**
3.6 DC Circuits Ohms Law, Kirchhoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.	**1**	**2**	**2**	**1**
3.7 Resistance / Resistor a) Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings; Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge.	**-**	**2**	**2**	**1**
b) Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermistors, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge;	**-**	**1**	**1**	**-**
3.8 Power Power, work and energy (kinetic and potential); Dissipation of power by a resistor; Power formula; Calculations involving power, work and energy.	**-**	**2**	**2**	**1**

3.9 Capacitance / Capacitor Operation and function of a capacitor; Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating; Capacitor types, construction and function; Capacitor colour coding; Calculations of capacitance and voltage in series and parallel circuits; Exponential charge and discharge of a capacitor, time constants; Testing of capacitors.	-	2	2	1

	Level			
	A	B1	B2	B3
3.10 Magnetism a) Theory of magnetism; Properties of a magnet; Action of a magnet suspended in the Earth's magnetic field; Magnetisation and demagnetisation; Magnetic shielding; Various types of magnetic material; Electromagnets construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor.	-	2	2	1
b) Magnetomotive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets.	-	2	2	1

3.11 Inductance / Inductor Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field; Induction principles; Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductors turns; Mutual induction; The effect the rate of change of primary current and mutual inductance has on induced voltage; Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other; Lenz's Law and polarity determining rules; Back emf, self-induction; Saturation point; Principle uses of inductors;	-	2	2	1
3.12 DC Motor / Generator Theory Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of, and factors affecting output and direction of current flow in DC generators; Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter Generator construction.	-	2	2	1
	Level			
	A	**B1**	**B2**	**B3**
3.13 AC Theory Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power Triangular/Square waves; Single / 3 phase principles.	1	2	2	1
3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations; True power, apparent power and reactive power calculations.	-	2	2	1
	Level			

	A	B1	B2	B3
3.15 Transformers Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings; Calculation of line and phase voltages and currents; Calculation of power in a three-phase system; Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers	-	2	2	1
3.16 Filters Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.	-	1	1	-
3.17 AC Generators Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators; Single-phase, two-phase and three-phase alternators; Three-phase star and delta connections advantages and uses; Permanent Magnet Generators.	-	2	2	1

	Level			
	A	B1	B2	B3
3.18 AC Motors Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and polyphase; Methods of speed control and direction of rotation; Methods of producing a rotating field: capacitor, inductor, shaded or split pole.	-	2	2	1

Module 4: Electronic Fundamentals

	Level			
	A	B1	B2	B3
4.1 Semiconductors				
4.1.1 Diodes				

a) Diode symbols; Diode characteristics and properties; Diodes in series and parallel; Main characteristics and use of silicon-controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes; Functional testing of diodes.	-	2	2	2
b) Materials, electron configuration, electrical properties; P and N type materials: effects of impurities on conduction, majority and minority characters; PN junction in a semiconductor, development of a potential across a PN junction in unbiased, forward biased and reverse biased conditions; Diode parameters: peak inverse voltage, maximum forward current, temperature, frequency, leakage current, power dissipation; Operation and function of diodes in the following circuits: clippers, clampers, full and half wave rectifiers, bridge rectifiers, voltage doublers and triplers; Detailed operation and characteristics of the following devices: silicon-controlled rectifier (thyristor), light-emitting diode, Shottky diode, photoconductive diode, varactor diode, varistor, rectifier diodes, Zener diode.	-	-	2	-
4.1.2 Transistors				
a) Transistor symbols; Component description and orientation; Transistor characteristics and properties.	-	1	2	1
b) Construction and operation of PNP and NPN transistors; Base, collector and emitter configurations; Testing of transistors. Basic appreciation of other transistor types and their uses. Application of transistors: classes of amplifier (A, B, C); Simple circuits including: bias, decoupling, feedback and stabilisation; Multistage circuit principles: cascades, push-pull, oscillators, multivibrators, Flip-flop circuits.	-	-	2	-

	Level			
	A	B1	B2	B3
4.1.3 Integrated Circuits				
a) Description and operation of logic circuits and linear circuits / operational amplifiers.				
b) Description and operation of logic circuits and linear circuits; Introduction to operation and function of an operational amplifier used as: integrator, differentiator, voltage follower, comparator; Operation and amplifier stages connecting methods: resistive capacitive, inductive (transformer), inductive resistive (IR), direct; Advantages and disadvantages of positive and negative feedback.				
4.2 Printed Circuit Boards Description and use of printed circuit boards.	-	1	2	
4.3 Servomechanisms				

a) Understanding of the following terms: Open and closed loop systems, feedback, follow up, analogue transducers; Principles of operation and use of the following synchro system components /features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters.	-	1	-	-
b) Understanding of the following terms: Open and closed loop, follow up, servomechanism, analogue, transducer, null, damping, feedback, deadband; Construction operation and use of the following synchro system components: resolvers, differential, control and torque, E and I transformers, inductance transmitters, capacitance transmitters, synchronous transmitters; Servomechanism defects, reversal of synchro leads, hunting.	-	-	2	-

Module 5: Digital Techniques/ Electronic Instrument Systems

	Level				
	A	B1.1 B1.3	B1.2 B1.4	B2	B3
5.1 Electronic Instrument Systems Typical systems arrangements and cockpit layout of electronic instrument systems.	1	1	1	1	1
5.2 Numbering Systems Numbering systems: binary, octal and hexadecimal; Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa	-	1	-	2	-
5.3 Data Conversion Analogue Data, Digital Data; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.	-	2	-	2	-
5.4 Data Buses Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications.	-	2	-	2	-
5.5 Logic Circuits					
a) Identification of common logic gate symbols, tables, and equivalent circuits; Applications used for aircraft systems, schematic diagrams.	-	2	-	2	1
b) Interpretation of logic diagrams.	-	-	-	2	
5.6 Basic Computer Structure					
a) Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM); Computer technology (as applied in aircraft systems).	1	2	-	-	-

Computer related terminology; Operation, layout, and interface of the major components in a microcomputer including their associated bus systems; Information contained in single and multi-address instruction words; Memory associated terms; Operation of typical memory devices; Operation, advantages, and disadvantages of the various data storage	-	-	-	2	-
5.7 Microprocessors Functions performed and overall operation of a microprocessor; Basic operation of each of the following microprocessor elements: control and processing unit, clock, register, arithmetic logic unit.	-	-	-	2	-
5.8 Integrated Circuits Operation and use of encoders and decoders; Function of encoder types; Uses of medium, large, and very large-scale integration.	-	-	-	2	-

	Level				
	A	B1.1 B1.3	B1.2 B1.4	B2	B3
5.9 Multiplexing Operation, application, and identification in logic diagrams of multiplexers and demultiplexers.	-	-	-	2	-
5.10 Fibre Optics Advantages and disadvantages of fibre optic data transmission over electrical wire propagation; Fibre optic data bus; Fibre optic related terms; Terminations; Couplers, control terminals, remote terminals; Application of fibre optics in aircraft systems.	-	1	1	2	-
5.11 Electronic Displays Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes and Liquid Crystal Display.	-	2	1	2	1
5.12 Electrostatic Sensitive Devices Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component, and personnel anti-static protection devices.	1	2	2	2	1
5.13 Software Management Control Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.	-	2	1	2	1

5.14 Electromagnetic Environment Influence of the following phenomena on maintenance practices for electronic system: EMC- Electromagnetic Compatibility EMI- Electromagnetic Interference HIRF- High Intensity Radiated Field Lightning / lightning protection	-	2	2	2	1

	Level				
	A	**B1.1 B1.3**	**B1.2 B1.4**	**B2**	**B3**
5.15 Typical Electronic / Digital Aircraft Systems General arrangement of typical electronic/digital aircraft systems and associated BITE (Built-in Test Equipment) testing such as: *a) For B1 and B2 only:* ACARS - ARINC Communication and Addressing and Reporting System EICAS - Engine Indication and Crew Alerting System FBW- Fly-by-Wire FMS - Flight Management System IRS- Inertial Reference System *b) For B1, B2 and B3 only:* ECAM- Electronic Centralised Aircraft Monitoring EFIS - Electronic Flight Instrument System GPS- Global Positioning System TCAS- Traffic Alert Collision Avoidance System Integrated Modular Avionics Cabin Systems Information Systems	1	1	1	1	1

Module 6: Materials and Hardware

	Level			
	A	B1	B2	B3
6.1 Aircraft Materials – *Ferrous*				
a) Characteristics, properties, and identification of common alloy steels used in aircraft; Heat treatment and application of alloy steels;	**1**	**2**	**1**	**2**
b) Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.	**-**	**1**	**1**	**1**
c) Repair and inspection procedures.	**-**	2	1	2
6.2 Aircraft Materials - *Non-Ferrous*				
a) Characteristics, properties, and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials;	**1**	**2**	**1**	**2**
b) Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.	**-**	**1**	**1**	**1**
c) Repair and inspection procedures.	**-**	2	1	2
6.3 Aircraft Materials - *Composite and Non-Metallic*				
6.3.1 Composite and non metallic other than wood and fabric				
a) Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft; Sealant and bonding agents.	**1**	**2**	**2**	**2**
b) The detection of defects/deterioration in composite and non-metallic material. Repair of composite and non-metallic material.	**1**	**2**	**-**	**2**
6.3.2 Wooden structures Construction methods of wooden airframe structures; Characteristics, properties and types of wood and glue used in aeroplanes; Preservation and maintenance of wooden structure; Types of defects in wood material and wooden structures; The detection of defects in wooden structure; Repair of wooden structure.	**1**	**1**	**-**	**1**
6.3.3 Fabric covering Characteristics, properties, and types of fabrics used in aeroplanes; Inspections methods for fabric; Types of defects in fabric; Repair of fabric covering.	**-**	**1**	**-**	**1**
6.4 Corrosion				
a) Chemical fundamentals; Formation by, galvanic action process, microbiological, stress;	**1**	**1**	**1**	**1**

b) Types of corrosion and their identification; Causes of corrosion; Material types, susceptibility to corrosion.	**2**	**3**	**2**	**2**
	Level			
	A	**B1**	**B2**	**B3**
6.5 Fasteners				
6.5.1 *Screw threads* Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; Measuring screw threads;	**2**	**2**	**2**	**2**
6.5.2 *Bolts, studs, and screws* Bolt types: specification, identification and marking of aircraft bolts, international standards; Nuts: self locking, anchor, standard types; Machine screws: aircraft specifications; Studs: types and uses, insertion and removal; Self tapping screws, dowels.	**2**	**2**	**2**	**2**
6.5.3 *Locking devices* Tab and spring washers, locking plates, split pins, pal-nuts, wire locking, quick release fasteners, keys, circlips, cotter pins.	**2**	**2**	**2**	**2**
6.5.4 *Aircraft rivets* Types of solid and blind rivets: specifications and identification, heat treatment.	**1**	**2**	**1**	**2**
6.6 Pipes and Unions				
a) Identification of, and types of rigid and flexible pipes and their connectors used in aircraft;	**2**	**2**	**2**	**2**
b) Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.	**2**	**2**	**1**	**2**
6.7 Springs Types of springs, materials, characteristics, and applications.	**-**	**2**	**1**	**2**
6.8 Bearings Purpose of bearings, loads, material, construction; Types of bearings and their application.	**1**	**2**	**2**	**1**
6.9 Transmissions Gear types and their application; Gear ratios, reduction, and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains, and sprockets.	**1**	**2**	**2**	**1**
6.10 Control Cables Types of cables; End fittings, turnbuckles, and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems.	**1**	**2**	**1**	**2**

6.11 Electrical Cables and Connectors Cable types, construction, and characteristics; High tension and co-axial cables; Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.	**1**	**2**	**2**	**2**

Module 7: Maintenance Practices

	Level		
	A	**B1/ B3**	**B2**
7.1 Safety Precautions-Aircraft and Workshop Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils, and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.	**3**	**3**	**3**
7.2 Workshop Practices Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.	**3**	**3**	**3**
7.3 Tools Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function, and use of electrical general test equipment;	**3**	**3**	**3**
7.4 Avionic General Test Equipment Operation, function, and use of avionic general test equipment.	**-**	**2**	**3**
7.5 Engineering Drawings, Diagrams and Standards Drawing types and diagrams, their symbols, dimensions, tolerances, and projections; Identifying title block information; Microfilm, microfiche, and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS, and MIL; Wiring diagrams and schematic diagrams.	**1**	**2**	**2**
7.6 Fits and Clearances Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist, and wear; Standard methods for checking shafts, bearings, and other parts.	**1**	**2**	**1**

7.7 Electrical Wiring Interconnection System (EWIS) Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Identification of wire types, their inspection criteria and damage tolerance. Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding.	**1**	**3**	**3**

	Level		
	A	**B1**	**B2**
7.8 Riveting Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.	**1**	**2**	**-**
7.9 Pipes and Hoses Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.	**1**	**2**	**-**
7.10 Springs Inspection and testing of springs.	**1**	**2**	**-**
7.11 Bearings Testing, cleaning, and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.	**1**	**2**	**-**
7.12 Transmissions Inspection of gears, backlash; Inspection of belts and pulleys, chains, and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.	**1**	**2**	**-**
7.13 Control Cables Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.	**1**	**2**	**-**
7.14 Material handling			
7.14.1 Sheet Metal Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work.	**-**	**2**	**-**
7.14.2 Composite and non-metallic Bonding practices; Environmental conditions Inspection methods	**-**	**2**	**-**
7.14.3 Additive Manufacturing	**1**	**1**	**1**
7.15 Welding, Brazing, Soldering and Bonding			
a) Soldering methods; inspection of soldered joints.	**-**	**2**	**2**

c) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints.	-	2	-
7.16 Aircraft Weight and Balance			
a) Centre of Gravity / Balance limits calculation: use of relevant documents;	-	2	2
b) Preparation of aircraft for weighing; Aircraft weighing;	-	2	-

	Level		
	A	B1	B2
7.17 Aircraft Handling and Storage Aircraft taxiing / towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling / defuelling procedures; De-icing/anti-icing procedures; Electrical, hydraulic, and pneumatic ground supplies. Effects of environmental conditions on aircraft handling and operation.	2	2	2
7.18 Disassembly, Inspection, Repair and Assembly Techniques			
a) Types of defects and visual inspection techniques. Corrosion removal, assessment and reprotection.	2	3	3
b) General repair methods, Structural Repair Manual; Ageing, fatigue, and corrosion control programmes;	-	2	-
c) Non destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods.	-	2	1
d) Disassembly and re-assembly techniques.	2	2	2
e) Troubleshooting techniques	-	2	2
7.19 Abnormal Events			
a) Inspections following lightning strikes and HIRF penetration.	2	2	2
b) Inspections following abnormal events such as heavy landings and flight through turbulence.	2	2	-
7.20 Maintenance Procedures Maintenance planning; Modification procedures; Stores procedures; Certification/release procedures; Interface with aircraft operation; Maintenance Inspection/Quality Control/Quality Assurance; Additional maintenance procedures. Control of life limited components	1	2	2

7.20 Documentation & communication	1	2	2

Module 8: Basic Aerodynamics

	A/B3	B1/B2
8.1 Physics of the Atmosphere International Standard Atmosphere (ISA), application to aerodynamics.	1	2
8.2 Aerodynamics Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, upwash and downwash, vortices, stagnation; The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.	1	2
8.3 Theory of Flight Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation.	1	2
8.4 High Speed Airflow	1	2
8.5 Flight Stability and Dynamics Longitudinal, lateral, and directional stability (active and passive).	1	2

Module 9 - Human Factors

	Level
	ALL
9.1 General The need to take human factors into account; Incidents attributable to human factors / human error; "Murphy's" law.	2

9.2 Human Performance and Limitations Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.	**2**
9.3 Social Psychology Responsibility: individual and group; Motivation and de-motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision, and leadership.	**1**
9.4 Factors Affecting Performance Fitness / health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and underload; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse.	**2**
9.5 Physical Environment Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.	**1**
9.6 Tasks Physical work; Repetitive tasks; Visual inspection; Complex systems.	**1**
9.7 Communication Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information.	**2**
9.8 Human error Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e accidents) Avoiding and managing errors.	**2**
9.9 Safety Mnagement Hazards in the Workplace Recognising and avoiding hazards; Dealing with emergencies.	**2**
9.10 The Dirty Dozen and risk mitigation	**2**

Module 10 - Aviation Legislation

	Level			
	A	**B1**	**B2**	**B3**
10.1 *Regulatory Framework* Role of the International Civil Aviation Organisation; Role of TCAA and general understanding of Civil Aviation Regulations; advisory circulars, notices, Directives and Procedures. Relationship between the various regulations such as AMO, AOC, PEL, ATO, etc. Relationship with other Civil Aviation Authorities	**1**	**1**	**1**	**1**
10.2 Certifying Staff – Maintenance Detailed understanding of this manual	**2**	**2**	**2**	**2**
10.3 Approved Maintenance Organisations Detailed understanding of Civil Aviation (Approved maintenance organization) Regulation as ameded.	**2**	**2**	**2**	**2**
10.4 Independent certifying staff	**-**	**3**	**3**	**3**
10.5 Air operations Air Operators Certificates; Commercial Air Transport/Commercial Operations Operators responsibilities; in particular, regarding continuing airworthiness and maintenance Aircraft Maintenance Programme; MMEL/MEL/CDL; Documents to be carried on board; Aircraft placarding (markings);	**1**	**1**	**1**	**1**
10.6 Certification of aircraft, parts, and appliances				
a) General understanding of Technical Requirements and Administrative Procedures for the Airworthiness and Environmental Certification of Aircraft and the acceptability of related products, Parts, and appliances	**2**	**2**	**2**	**2**
b) *Documents* Certificate of Airworthiness; Certificate of Registration; Noise Certificate; Mass and balance programme Radio Station Licence and Approval.	**-**	**2**	**2**	**2**
10.7 Continuing airworthiness Detailed understanding of civil aviation (airworthiness) and (Operation of Aircraft) regulations provisions related to continuing airworthiness.	**2**	**2**	**2**	**2**

	Level

	A	B1	B2	B3
10.8 *Other Applicable Requirements*				
a) Maintenance Programmes, Maintenance checks and inspections; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.; Only for A to B2 licences: Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists;	**1**	**2**	**2**	**2**
b) Continuing airworthiness; Minimum equipment requirements - Test flights; Only for B1 and B2 licences: ETOPS/EDTO, maintenance and dispatch requirements; All Weather Operations, Category 2/3 operations.	**-**	**1**	**1**	**1**
10.9 Cybersecurity in aviation maintenance	**1**	**1**	**1**	**1**

Module 11: Turbine Aeroplane Aerodynamics, Structures and Systems

	Level				
	A1	A2	B1.1	B1.2	B3
11.1 Theory of Flight					
11.1.1 Aeroplane Aerodynamics and Flight Controls Operation and effect of: - roll control: ailerons and spoilers; - pitch control: elevators, stabilators, variable incidence stabilisers and canards; - yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices, slots, slats, flaps, flaperons; Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading-edge devices; Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;	1	1	2	2	1
11.1.2 High Speed Flight Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number, compressibility buffet, shock wave, aerodynamic heating, area rule; Factors affecting airflow in engine intakes of high-speed aircraft; Effects of sweepback on critical Mach number.	1	1	2	2	1
11.2 Airframe Structures - General Concepts					
a) Airworthiness requirements for structural strength; Structural classification, primary, secondary, and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue Drains and ventilation provisions; System installation provisions; Lightning strike protection provision. Aircraft bonding	2	2	2	2	2
b) Airworthiness requirements for structural strength;	2	2	2	2	2
c) Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage, and engine attachments; Structure assembly techniques: riveting, bolting, bonding; Methods of surface protection, such as chromating, anodising,	1	1	2	2	2

painting; Surface cleaning. Airframe symmetry: methods of alignment and symmetry checks.					
11.3 Airframe Structures – Aeroplanes					
11.3.1 Fuselage (ATA 52 / 53 / 56) Construction and pressurisation sealing; Wing, stabiliser, pylon, and undercarriage attachments; Seat installation and cargo loading system; Doors and emergency exits: construction, mechanisms, operation, and safety devices; Windows and windscreen construction and mechanisms.	**1**	**1**	**2**	**2**	**1**
11.3.2 Wings (ATA 57) Construction; fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.	**1**	**1**	**2**	**2**	**1**
11.3.3 Stabilisers (ATA 55) Construction; Control surface attachment.					
11.3.4 Flight Control Surfaces (ATA 55/57) Construction and attachment; Balancing – mass and aerodynamic.					
11.3.5 Nacelles/Pylons (ATA 54) - Construction; - Firewalls; - Engine mounts.					
11.4 Air Conditioning and Cabin Pressurisation (ATA 21)					
11.4.1 *Air supply* Sources of air supply including engine bleed, APU, and ground cart;	**1**	**-**	**3**	**-**	**-**
11.4.2 *Air Conditioning* Air conditioning systems; Air cycle and vapour cycle machines; Distribution systems; Flow, temperature, and humidity control system.	**1**	**-**	**3**	**-**	**-**
11.4.3 *Pressurisation* Pressurisation systems; Control and indication including control and safety valves; Cabin pressure controllers.	**1**	**1**	**3**	**3**	**-**
11.4.4 *Safety and warning devices* Protection and warning devices.	**1**	**1**	**3**	**3**	**-**
11.4.5 *Heating and ventilation system.*	**-**	**1**	**-**	**3**	**1**

	Level				
	A1	**A2**	**B1.1**	**B1.2**	**B3**
11.5 Instruments/Avionic Systems					
11.5.1 *Instrument Systems* (ATA 31) Pitot static: altimeter, air speed indicator, vertical speed indicator; Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn co-ordinator; Compasses: direct reading, remote reading; Angle of attack indication, stall warning systems; Glass cockpit; Other aircraft system	**1**	**1**	**2**	**2**	**2**
11.5.2 Avionic Systems Fundamentals of system lay-outs and operation of: - Auto Flight (ATA 22); - Communications (ATA 23); - Navigation Systems (ATA 34).	**1**	**1**	**1**	**1**	**1**
11.6 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation; Power distribution; Inverters, transformers,	**1**	**1**	**3**	**3**	**3**
11.7 Equipment and Furnishings (ATA 25)					
a) Emergency equipment requirements; Seats, harnesses, and belts.	**2**	**2**	**2**	**2**	**2**
b) Cabin lay-out; Equipment lay- out; Cabin Furnishing Installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs.	**1**	**1**	**1**	**1**	**--**
11.8 Fire Protection (ATA 26)					
(a)Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	**1**	**1**	**1**	**1**	**-**
(b)Portable fire extinguisher	**1**	**1**	**1**	**1**	**1**

	Level				
	A1	**A2**	**B1.1**	**B1.2**	**B3**
11.9 Flight Controls (ATA 27) (a) Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, speed brakes; Stall protection/warning system.	**1**	**1**	**3**	**2**	**2**
(b) Actuation and protection;	**1**	**-**	**3**	**-**	**-**
(c) System operation: manual, hydraulic, pneumatic, electrical, fly-by-wire; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks systems;	**1**	**-**	**3**	**-**	**-**
(d) Balancing and rigging;	**1**	**1**	**3**	**3**	**2**
11.10 Fuel Systems (ATA 28 ATA 47)					
(a) Systems layout; Fuel tanks Supply systems	**1**	**1**	**3**	**3**	**1**
(b) Fuel handling Dumping, venting, and draining; Cross-feed and transfer	**1**	**1**	**3**	**3**	**1**
(c) Indication and warnings	**1**	**1**	**3**	**3**	**1**
d) Special systems; Refuelling and defueling;	**1**	**-**	**3**	**-**	**-**
(e) Balancing. Longitudinal balance fuel systems.	**1**	**-**	**3**	**-**	**-**

11.11 Hydraulic Power (ATA 29) System lay out; System Operation Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters; Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.	**1**	**1**	**3**	**3**	**2**
11.12 Ice and Rain Protection (ATA 30) (a) Princoples Ice formation, classification, and detection;	**1**	**1**	**3**	**3**	**1**
(a) De-icing systems: electrical, hot air, pneumatic and chemical; Rain repellant; Probe and drain heating.	**1**	**1**	**3**	**3**	**1**
c) Anti-icing systems: electrical, hot air and chemical;	**1**	**-**	**3**	**-**	**-**
d) Wiper systems	**1**	**1**	**3**	**3**	**1**
e) Tail protection.	**1**	**-**	**3**	**-**	**-**
11.13 Landing Gear (ATA 32) a) Description Construction, shock absorbing;	**2**	**2**	**3**	**3**	**2**
b) System Operation Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and autobraking; Tyres; Steering;	**2**	**2**	**3**	**3**	**2**
d) Air-ground sensing.	**2**	**-**	**3**	**-**	**-**
e) Tail Protection	**2**	**2**	**3**	**3**	**2**
11.14 Lights (ATA 33) External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	**2**	**2**	**3**	**3**	**2**

11.15 Oxygen (ATA 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;	**1**	**1**	**3**	**3**	**2**
11.16 Pneumatic/Vacuum (ATA 36) System lay-out: cockpit, cabin Sources, storage, charging and distribution; Supply regulation; Indications and warnings; Interfaces with other systems.	**1**	**1**	**3**	**3**	**2**
11.17 Water/Waste (ATA 38) Water system layout, supply, distribution, servicing and draining; Toilet system layout, flushing and servicing; Corrosion aspects.	**2**	**2**	**3**	**3**	**2**
11.18 On Board Maintenance Systems (ATA 45) Central maintenance computers; Data loading system; Electronic library system; Printing;	**1**	**-**	**2**	**-**	**-**
11.19 Integrated Modular Avionics (ATA 42) Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc. Core System; Network Components;	**1**	**-**	**2**	**-**	**-**

11.20 Cabin Systems (ATA 44) The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music, and video transmissions. The Cabin Intercommunication Data System provides an interface between cockpit /cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels. The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems: Data/Radio Communication, In-Flight Entertainment System. The Cabin Network Service may host functions such as: - Access to pre-departure/departure reports, - E-mail/intranet/internet access, - Passenger database, - Cabin Core System; - In-flight Entertainment System - External Communication System; - Cabin Mass Memory System; - Cabin Monitoring System; - Miscellaneous Cabin System.	**1**	**-**	**2**	**-**	**-**
11.21 Information Systems (ATA 46) The units and components which furnish a means of storing, updating, and retrieving digital information traditionally provided on paper, microfilm, or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display. Typical examples include Air Traffic and Information Management Systems and Network Server Systems Aircraft General Information System; Flight Deck Information System;	**1**	**-**	**2**	**-**	**-**

Module 12: Helicopter Aerodynamics, Structures and Systems

	Level	
	A3 A4	B1.3 B1.4
12.1 Theory of Flight - Rotary Wing Aerodynamics Terminology; Effects of gyroscopic precession; Torque reaction and directional control; Dissymmetry of lift, Blade tip stall; Translating tendency and its correction; Coriolis effect and compensation; Vortex ring state, power settling, overpitching; Auto-rotation; Ground effect.	1	2
12.2 Flight Control Systems Cyclic control; Collective control; Swashplate; Yaw control: Anti-Torque Control, Tail rotor, bleed air; Main Rotor Head: Design and Operation features; Blade Dampers: Function and construction; Rotor Blades: Main and tail rotor blade construction and attachment; Trim control, fixed and adjustable stabilisers; System operation: manual, hydraulic, electrical and fly-by-wire; Artificial feel; Balancing and Rigging.	2	3
12.3 Blade Tracking and Vibration Analysis Rotor alignment; Main and tail rotor tracking; Static and dynamic balancing; Vibration types, vibration reduction methods; Ground resonance.	1	3
12.4 Transmissions Gear boxes, main and tail rotors; Clutches, free wheel units and rotor brake. Tail rotor drive shafts, flexible couplings, bearings, vibration dampers and bearing hangers	1	3

	Level

	A3 A4	B1.3 B1.4
12.5 Airframe Structures		
a) Airworthiness requirements for structural strength; Structural classification, primary, secondary, and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision.	**2**	**2**
b) Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning and anti-corrosive protection. Pylon, stabiliser, and undercarriage attachments; Seat installation; Doors: construction, mechanisms, operation, and safety devices; Windows and windscreen construction; Fuel storage; Firewalls; Engine mounts; Structure assembly techniques: riveting, bolting, bonding; Methods of surface protection, such as chromating, anodising, painting; Surface cleaning. Airframe symmetry: methods of alignment and symmetry checks.	**1**	**2**
12.6 Air Conditioning (ATA 21)		
12.6.1 *Air supply* Sources of air supply including engine bleed and ground cart;	**1**	**2**
12.6.2 *Air Conditioning* Air conditioning systems; Distribution systems; Flow and temperature control systems; Protection and warning devices.	**1**	**3**
12.7 Instruments/Avionic Systems		
12.7.1 *Instrument Systems* (ATA 31) Pitot static: altimeter, air speed indicator, vertical speed indicator; Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn co-ordinator; Compasses: direct reading, remote reading; Vibration indicating systems - HUMS; Glass cockpit; Other aircraft system indication.	**1**	**2**
12.7.2 *Avionic Systems* Fundamentals of system layouts and operation of; Auto Flight (ATA 22); Communications (ATA 23); Navigation Systems (ATA 34).	**1**	**1**

	Level	
	A3 A4	B1.3 B1.4
12.8 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation, AC power generation; Emergency power generation; Voltage regulation, Circuit protection. Power distribution; Inverters, transformers, rectifiers; External/Ground power.	1	3
12.9 Equipment and Furnishings (ATA 25)		
a) Emergency equipment requirements; Seats, harnesses, and belts; Lifting systems.	2	2
b) Emergency flotation systems; Cabin lay-out, cargo retention; Equipment lay-out; Cabin Furnishing Installation;	1	1
12.10 Fire Protection (ATA 26) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	1	3
12.11 Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Dumping, venting, and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.	1	3
12.12 Hydraulic Power (ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters; Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.	1	3

12.13 Ice and Rain Protection (ATA 30) Ice formation, classification, and detection; Anti-icing and De-icing systems: electrical, hot air and chemical; Rain repellant and removal; Probe and drain heating. Wiper system	**1**	**3**
12.14 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, Tyres, brakes; Steering; Skids, floats.	**2**	**3**
12.15 Lights (ATA 33) External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	**2**	**3**
12.16 Pneumatic/Vacuum (ATA 36) System lay-out; Sources: engine, compressors, reservoirs, ground supply.; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.	**1**	**3**
12.17 Integrated Modular Avionics (ATA 42) Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre	**1**	**2**
12.18 On Board Maintenance Systems (ATA 45)	**1**	**2**
Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).		
12.19 Information Systems (ATA 46)	**1**	**2**

The units and components which furnish a means of storing, updating, and retrieving digital information traditionally provided on paper, microfilm, or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display. Typical examples include Air Traffic and Information Management Systems and Network Server Systems. Aircraft General Information System; Flight Deck Information System; Maintenance Information System; Passenger Cabin Information System; Miscellaneous Information System.		

Module 13: Aircraft Aerodynamics, Structures and Systems

	Level
	B2
13.1 Theory of Flight	
a) Aeroplane Aerodynamics and Flight Controls Operation and effect of: - roll control: ailerons and spoilers; - pitch control: elevators, stabilators, variable incidence stabilisers and canards; - yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices: slots, slats, flaps; Drag inducing devices: spoilers, lift dumpers, speed brakes; Operation and effect of trim tabs, servo tabs, and control surface bias.	1
b) *High Speed Flight* Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number.	1
c) *Rotary Wing Aerodynamics* Terminology; Operation and effect of cyclic, collective, and anti-torque controls.	1
13.2 Structures - General Concepts	
a) Fundamentals of structural systems.	1
b) Zonal and station identification systems; Electrical bonding; Lightning strike protection provision.	2

13.3 Autoflight (ATA22) Fundamentals of automatic flight control including working principles and current terminology; Command signal processing; Modes of operation: roll, pitch, and yaw channels; Yaw dampers; Stability Augmentation System in helicopters; Automatic trim control; Autopilot navigation aids interface; Autothrottle systems. Automatic Landing Systems: principles and categories, modes of operation, approach, glide slope, land, go-around, system monitors and failure conditions.	**3**

	Level
	B2
13.4 Communication / Navigation (ATA23/34) Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver, and transmitter; Working principles of following systems: - Very High Frequency (VHF) communication; - High Frequency (HF) communication; - Audio; - Emergency Locator Transmitters; - Cockpit Voice Recorder; - Very High Frequency omnidirectional range (VOR); - Automatic Direction Finding (ADF); - Instrument Landing System (ILS); - Microwave Landing System (MLS); - Flight Director systems; Distance Measuring Equipment (DME); - Very Low Frequency and hyperbolic navigation (VLF/Omega); - Doppler navigation; - Area navigation, RNAV systems; - Flight Management Systems; - Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS); - Inertial Navigation System; - Air Traffic Control transponder, secondary surveillance radar; - Traffic Alert and Collision Avoidance System (TCAS); - Weather avoidance radar; - Radio altimeter; - ARINC communication and reporting;	**3**

13.5 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation; Power distribution; Inverters, transformers, rectifiers; Circuit protection; External/Ground power.	**3**
13.6 Equipment and Furnishings (ATA 25) Electronic emergency equipment requirements. Cabin entertainment equipment.	**3**
13.7 Flight Controls (ATA 27)	
a) Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks. Stall protection systems.	**2**
b) System operation: electrical, Fly-by-Wire.	**3**

	Level B2
13.8 Instrument Systems (ATA 31) Classification; Atmosphere; Terminology; Pressure measuring devices and systems; Pitot static systems; Altimeters; Vertical speed indicators; Airspeed indicators; Machmeters; Altitude reporting / alerting systems; Air data computers; Instrument pneumatic systems; Direct reading pressure and temperature gauges; Temperature indicating systems; Fuel quantity indicating systems; Gyroscopic principles; Artificial horizons; Slip indicators; Directional gyros; Ground Proximity Warning Systems; Compass systems; Flight Data Recording systems; Electronic Flight Instrument Systems; Instrument warning systems including master warning systems and centralised warning panels; Stall warning systems and angle of attack indicating systems; Vibration measurement and indication. Glass cockpit	**3**
13.9 Lights (ATA 33) External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	**3**
13.10 On board Maintenance Systems (ATA 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	**3**
13.11 Air Conditioning and Cabin Pressurisation (ATA 21)	
13.11.1. Air supply Sources of air supply including engine bleed, APU, and ground cart;	**2**
13.11.2. Air Conditioning	
Air conditioning systems;	**2**
Air cycle and vapour cycle machines;	**3**
Distribution systems;	**1**
Flow, temperature, and humidity control system;	**3**
13.11.3. Pressurisation Pressurisation systems; Control and indication including control and safety valves; Cabin pressure controllers;	**3**

13.11.4. Safety and warning devices Protection and warning devices	

	Level B2
13.12 Fire Protection (ATA 26)	
(a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	**3**
(b) Portable fire extinguisher	**1**
13.13 Fuel Systems (ATA 28)	
System lay-out;	**1**
Fuel tanks;	**1**
Supply systems;	**1**
Dumping, venting, and draining;	**1**
Cross-feed and transfer;	**2**
Indications and warnings;	**3**
Refuelling and defueling;	**2**
Longitudinal balance fuel systems.	**3**
13.14 Hydraulic Power (ATA 29)	
System lay-out;	**1**
Hydraulic fluids;	**1**
Hydraulic reservoirs and accumulators;	**1**
Pressure generation: electrical, mechanical, pneumatic;	**3**
Emergency pressure generation;	**3**
Filters;	**1**
Pressure control;	**3**
Power distribution;	**1**
Indication and warning systems;	**3**
Interface with other systems.	**3**
13.15 Ice and Rain Protection (ATA 30)	
Ice formation, classification, and detection;	**2**
Anti-icing systems: electrical, hot air and chemical;	**2**
De-icing systems: electrical, hot air, pneumatic, chemical;	**3**
Rain repellent;	**1**
Probe and drain heating;	**3**
Wiper Systems.	**1**
13.16 Landing Gear (ATA 32)	
Construction, shock absorbing;	**1**
Extension and retraction systems: normal and emergency;	**3**
Indications and warnings;	**3**
Wheels, brakes, antiskid and autobraking;	**3**
Tyres;	**1**
Steering;	**3**
Air-ground sensing.	**3**
13.17 Oxygen (ATA 35)	

System lay-out: cockpit, cabin;	**3**
Sources, storage, charging and distribution;	**3**
Supply regulation;	**3**
Indications and warnings;	**3**
13.18 Pneumatic/Vacuum (ATA 36)	
System lay-out;	**2**
Sources: engine/APU, compressors, reservoirs, ground supply;	**2**
Pressure control;	**3**
Distribution;	**1**
Indications and warnings;	**3**
Interfaces with other systems.	**3**
13.19 Water/Waste (ATA 38) Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing.	**2**
13.20 Integrated Modular Avionics (ATA 42) Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.; Core System; Network Components.	**3**
13.21 Cabin Systems (ATA 44) The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music, and video transmissions. The Cabin Intercommunication Data System provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels. The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems: Data/Radio Communication, In-Flight Entertainment System. The Cabin Network Service may host functions such as: Access to pre-departure/departure reports, E-mail/intranet/internet access, Passenger database; Cabin Core System; In-flight Entertainment System; External Communication System; Cabin Mass Memory System; Cabin Monitoring System; Miscellaneous Cabin System.	**3**

13.22 Information Systems (ATA 46) The units and components which furnish a means of storing, updating, and retrieving digital information traditionally provided on paper, microfilm, or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display. Typical examples include Air Traffic and Information Management Systems and Network Server Systems. Aircraft General Information System; Flight Deck Information System; Maintenance Information System; Passenger Cabin Information System; Miscellaneous Information System.	**3**

Module 14: Propulsion

	Level B2
14.1 Engines	
a) Turbine Engines: Constructional arrangement and operation of turbojet, turbofan, turboshaft and turbopropeller engines.	**1**
(b) Auxiliary power units (APUs);	**1**
(c) Piston engines;	**1**
(d) Electric and hybrid engines;	**2**
(e) Engine control.	**2**
14.2 Electric/electronic engine indication systems Exhaust gas temperature / Interstage turbine temperature systems; Engine speed; Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems; Oil pressure and temperature; Fuel pressure, temperature, and flow; Manifold pressure; Engine torque; Propeller speed.	**2**
14.3 Propeller systems	**2**
14.4 Starting and Ignition Systems Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements.	**2**

Module 15: Gas Turbine Engine

	Level	
	A1 A3	B1.1 B1.3
15.1 Fundamentals Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle; The relationship between force, work, power, energy, velocity, acceleration; Constructional arrangement and operation of turbojet, turbofan, turboshaft, turboprop.	1	2
15.2 Engine Performance Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption; Engine efficiencies; By-pass ratio and engine pressure ratio; Pressure, temperature, and velocity of the gas flow; Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations.	-	2
15.3 Inlet Compressor inlet ducts Effects of various inlet configurations; Ice protection.	2	2
15.4 Compressors Axial and centrifugal types; Constructional features and operating principles and applications Fan balancing; Operation: Causes and effects of compressor stall and surge; Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades;	1	2

	Level	
	A1 A3	B1.1 B1.3
15.5 Combustion Section Construction features and principles of operation	1	2
15.6 Turbine Section Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes and effects of turbine blade stress and creep.	2	2
15.7 Exhaust Constructional features and principles of operation; Convergent, divergent, and variable area nozzles; Engine noise reduction. Thrust reversers.	1	2
15.8 Bearings and Seals Constructional features and principles of operation.	-	2
15.9 Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	1	2
15.10 Lubrication Systems System operation/lay-out and components.	1	2
15.11 Fuel Systems Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	1	2
15.12 Air Systems Operation of engine air distribution and anti - ice control systems, including internal cooling, sealing and external air services.	1	2
15.13 Starting and Ignition Systems Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements.	1	2
15.14 Engine Indication Systems Exhaust Gas Temperature/Interstage Turbine Temperature; Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems; Oil pressure and temperature; Fuel pressure and flow; Engine speed; Vibration measurement and indication; Torque; Power.	1	2
15.15 Alternate turbine constructions	-	1

15.16 Turbo-prop Engines Gas coupled/free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Overspeed safety devices.	**1**	**2**
15.17 Turbo-shaft engines Arrangements, drive systems, reduction gearing, couplings, control systems.	**1**	**2**
15.18 Auxiliary Power Units (APUs) Purpose, operation, protective systems.	**1**	**2**
15.19 Powerplant Installation Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti- vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.	**1**	**2**
15.20 Fire Protection Systems Operation of detection and extinguishing systems.	**1**	**2**
15.21 Engine Monitoring and Ground Operation Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Trend (including oil analysis, vibration and boroscope) monitoring; Inspection of engine and components to criteria, tolerances, and data specified by engine manufacturer; Compressor washing/cleaning; Foreign Object Damage.	**1**	**3**
15.22 Engine Storage and Preservation Preservation and depreservation for the engine and accessories/systems.	**-**	**2**

Module 16: Piston Engine

	Level	
	A2 A4	**B1.2 B1.4 B3**
16.1 Fundamentals Mechanical, thermal, and volumetric efficiencies; Operating principles – 2-stroke, 4-stroke, Otto and Diesel; Piston displacement and compression ratio; Engine configuration and firing order.	**1**	**2**
16.2 Engine Performance Power calculation and measurement; Factors affecting engine power; Mixtures/leaning, pre-ignition.	**1**	**2**

16.3 Engine Construction Crank case, crank shaft, cam shafts, sumps; Accessory gearbox. Cylinder and piston assemblies; Connecting rods, inlet, and exhaust manifolds; Valve mechanisms. Propeller reduction gearboxes;	**1**	**2**
16.4 Engine Fuel Systems		
16.4.1 *Carburettors* Types, construction, and principles of operation; Icing and heating;	**1**	**2**
16.4.2 *Fuel injection systems* Types, construction, and principles of operation.	**1**	**2**
16.4.3 *Electronic engine control* Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	**1**	**2**
16.5 Starting and Ignition Systems Starting systems, pre-heat systems; Magneto types, construction, and principles of operation; Ignition harnesses, spark plugs; Low- and high-tension systems.	**1**	**2**

	Level	
	A2 **A4**	**B1.2** **B1.4** **B3**
16.6 Induction, Exhaust and Cooling Systems Construction and operation of: induction systems including alternate air systems; Exhaust systems, engine cooling systems – air and liquid.	**1**	**2**
16.7 Supercharging/Turbocharging Principles and purpose of supercharging and its effects on engine parameters; Construction and operation of supercharging/turbocharging systems; System terminology; Control systems; System protection.	**1**	**2**
16.8 Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	**1**	**2**
16.9 Lubrication Systems System operation/lay-out and components.	**1**	**2**

16.10 Engine Indication Systems Engine speed; Cylinder head temperature; Coolant temperature; Oil pressure and temperature. Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure.	**1**	**2**
16.11 Powerplant Installation Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti- vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.	**1**	**2**
16.12 Engine Monitoring and Ground Operation Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Inspection of engine and components: criteria, tolerances, and data specified by engine manufacturer	**1**	**3**
16.13 Engine Storage and Preservation Preservation and depreservation for the engine and accessories/systems.	**-**	**2**
16.14 Alternative piston engine constructions	**1**	**1**

Module 17: Propeller

	Level	
	A1 A2	**B1.1 B1.2 B3**
17.1 Fundamentals Blade element theory; High/low blade angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance.	**1**	**2**
17.2Propeller Construction Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation.	**1**	**2**

17.3 Propeller Pitch Control Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection.	**1**	**2**
17.4 Propeller Synchronising Synchronising and synchrophasing equipment.	**-**	**2**
17.5 Propeller Ice Protection Fluid and electrical de-icing equipment.	**1**	**2**
17.6 Propeller Maintenance Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running.	**1**	**3**
17.7 Propeller Storage and Preservation Propeller preservation and depreservation	**1**	**2**

Appendix II
Basic Examination Standard

1.0 General

1.1 All basic examinations shall be carried out using the multiple-choice question format and essay questions as specified below. The incorrect alternatives shall seem equally plausible to anyone ignorant of the subject. All the alternatives shall be clearly related to the question and of similar vocabulary, grammatical construction, and length. In numerical questions, the incorrect answers shall correspond to procedural errors such as corrections applied in the wrong sense or incorrect unit conversions: they shall not be mere random numbers.

1.2 Each multiple-choice question shall have three alternative answers of which only one shall be the correct answer and the candidate shall be allowed a time per module which is based upon a nominal average of 75 seconds per question.

1.3 Each essay question requires the preparation of a written answer and the candidate shall be allowed 20 minutes to answer each such question.

1.4 Suitable essay questions shall be drafted and evaluated using the knowledge syllabus in this manual Appendix I Modules 7.

1.5 Each question will have a model answer drafted for it, which will also include any known alternative answers that may be relevant for other subdivisions.

1.6 The model answer will also be broken down into a list of the important points known as Key Points.

1.7 The pass mark for each module and sub-module multiple-choice part of the examination is 70 %.

1.8 The pass mark for each essay question is 70 % in that the candidates answer shall contain 70 % of the required key points addressed by the question and no significant error related to any required key point.

1.9 If either the multiple-choice part only or the essay part only is failed, then it is only necessary to retake the multiple-choice or essay part, as appropriate.

1.10 Penalty marking systems shall not be used to determine whether a candidate has passed.

1.11 A failed module may not be retaken for at least 90 days following the date of the failed module examination, except in the case of a maintenance training organisation approved in accordance with civil aviation (Approved Training Organization) Regulations which conducts a course of retraining tailored to the failed subjects in the module when the failed module may be retaken after 30 days.

1.12 The time periods shall apply to each individual module examination, with the exception of those module examinations which were passed as part of another category licence, where the licence has already been issued.

1.13 The maximum number of consecutive attempts for each module is three in a 12-month period. Further sets of three attempts are allowed with a one-year waiting period between sets. The applicant shall confirm in writing to the Authority to which they apply for an examination, the number and dates of attempts during the last year. The Authority is responsible for checking the number of attempts within the applicable timeframes.

2.0 Number of questions per module

Module 1 - Mathematics

Category A: 16 multiple-choice and 0 essay questions. Time allowed 20 minutes.

Category B1: 32 multiple-choice and 0 essay questions. Time allowed 40 minutes.

Category B2: 32 multiple-choice and 0 essay questions. Time allowed 40 minutes.

Category B3: 32 multiple-choice and 0 essay questions. Time allowed 40 minutes

Module 2 – Physics

Category A: 32 multiple-choice and 0 essay questions. Time allowed 40 minutes.

Category B1: 52 multiple-choice and 0 essay questions. Time allowed 65 minutes.

Category B2: 52 multiple-choice and 0 essay questions. Time allowed 65 minutes.
Category B3: 32 multiple-choice and 0 essay questions. Time allowed 40 minutes.

Module 3 - Electrical Fundamentals:
Category A: 20 multiple-choice and 0 essay questions. Time allowed 25 minutes.
Category B1: 52 multiple-choice and 0 essay questions. Time allowed 65 minutes.
Category B2: 52 multiple-choice and 0 essay questions. Time allowed 65 minutes.
Category B3: 24 multi-choice and 0 essay questions. Time allowed 30 minutes

Module 4 - Electrical Fundamentals:
Category B1: 20 multiple-choice and 0 essay questions. Time allowed 25 minutes.
Category B2: 40 multiple-choice and 0 essay questions. Time allowed 50 minutes.
Category B3: 20 multiple-choice and 0 essay questions. Time allowed 25 minutes

Module 5 - Digital Techniques/Electronic Instrument Systems
Category A: 20 multiple-choice and 0 essay questions. Time allowed 25 minutes.
Category B1: 40 multiple-choice and 0 essay questions. Time allowed 50 minutes.
Category B2: 72 multiple-choice and 0 essay questions. Time allowed 90 minutes.
Category B3: 20 multiple-choice and 0 essay questions. Time allowed 25 minutes.

Module 6 - Materials and Hardware
Category A: 52 multiple-choice and 0 essay questions. Time allowed 65 minutes.
Category B1: 80 multiple-choice and 0 essay questions. Time allowed 100 minutes.
Category B2: 60 multiple-choice and 0 essay questions. Time allowed 75 minutes.
Category B3: 80 multiple-choice and 0 essay questions. Time allowed 100 minutes.

Module 7 - Maintenance Practices
Category A: 76 multiple-choice and 2 essay questions. Time allowed 95 minutes plus 4`0 minutes.
Category B1 & B3: 80 multiple-choice and 2 essay questions. Time allowed 100 minutes plus 40 minutes.
Category B2: 60 multiple-choice and 2 essay questions. Time allowed 75 minutes plus 40 minutes.

Module 8 - Basic Aerodynamics
Category A: 24 multiple-choice and 0 essay questions. Time allowed 30 minutes.

Category B1: 24 multiple-choice and 0 essay questions. Time allowed 30 minutes.
Category B2: 24 multiple-choice and 0 essay questions. Time allowed 30 minutes.
Category B3: 24 multiple-choice and 0 essay questions. Time allowed 30 minutes.

Module 9 - Human Factors
Category A, B1, B2, B3: 28 multiple-choice. No Essay. Time allowed 35 minutes.

Module 10 - Aviation Legislation
Category A: 32 multiple-choice. Time allowed 40 minutes.
Category B1, B2, B3: 44 multiple-choice. Time allowed 55 minutes.

Module 11 - Turbine Aeroplane Aerodynamics, Structures and Systems
Category A1: 108 multiple-choice, no essay questions. Time allowed: 135 minutes.
Category A2: 72 multiple-choice, no essay questions. Time allowed: 90 minutes.
Category B1.1: 140 multiple-choice, no essay questions. Time allowed: 175 minutes.
Category B1.2: 100 multiple-choice, no essay questions. Time allowed: 125 minutes.
Category B3: 60 multiple-choice, no essay questions. Time allowed: 75 minutes.

Module 12 - Helicopter Aerodynamics, Structures and Systems:
Category A: 100 multiple-choice and 0 essay questions. Time allowed 125 minutes.
Category B1: 128 multiple-choice and 0 essay questions. Time allowed 160 minutes.

Module 13 - Aircraft Aerodynamics, Structures and Systems
Category B2: 188 multiple-choice and 0 essay questions. Time allowed 235 minutes.
Questions and time allowed may be split into two examinations as appropriate.

Module 14 - Propulsion:
Category B2: 32 multiple-choice and 0 essay questions. Time allowed 40 minutes.

Module 15 - Gas Turbine Engine:
Category A: 60 multiple-choice and 0 essay questions. Time allowed 75 minutes.
Category B1: 92 multiple-choice and 0 essay questions. Time allowed 115 minutes.

Module 16 - Piston Engine:
Category A: 52 multiple-choice and 0 essay questions. Time allowed 65 minutes.
Category B1, B3: 76 multiple-choice and 0 essay questions. Time allowed 95 minutes.

Module 17 - Propeller:

Category A: 20 multiple-choice and 0 essay questions. Time allowed 25 minutes.
Category B1, B3: 32 multiple-choice and 0 essay questions. Time allowed 40 minutes.

Appendix III
Aircraft Type Training and Type Evaluation Standard On-the-Job Training (OJT)

1.0 General
Aircraft type training shall consist of theoretical training and examination, and except for the category C ratings, practical training and assessment.

(a). Theoretical training and examination shall comply with the following requirements:

(i). Shall be conducted by a maintenance training organisation appropriately approved in accordance the Civil Aviation (Approved Training Organization) Regulations or, when conducted by other organisations approved by the Authority.
(ii). Shall comply with the standard described in paragraph 3.1 and 4 of this Appendix III, and if existing, the elements defined in the operational suitability data (OSD).
(iii). Shall have been started and completed within the three years preceding the application for a type rating endorsement.

(b). Practical training and assessment shall comply with the following requirements:
(i). Shall be conducted by a maintenance training organisation appropriately approved in accordance with Civil Aviation (Approved Training Organization) Regulations or, when conducted by other organisations approved by the Authority.
(ii). Shall comply with the standard described in paragraph 3.2 and 4 of this Appendix III, and if existing, the elements defined in the operational suitability data (OSD).
(iii). Shall include a representative cross section of maintenance activities relevant to the aircraft type.
(iv). Shall include demonstrations using equipment, components, maintenance simulation training devices (MSTDs), maintenance training devices (MTDs), or real aircraft.
(v). Shall have been started and completed within the three years preceding the application for a type rating endorsement.

(c). Differences training

(i). Differences training is the training required in order to cover the differences between:

a. two different aircraft type ratings of the same manufacturer as determined by the Authority or
b. two different licence categories in respect of the same aircraft type rating.

(ii). Differences training has to be defined on a case-to-case basis taking into account the requirements contained in this Appendix III in respect of both theoretical and practical elements of type rating training.

(iii). A type rating shall only be endorsed on a licence after differences training when the applicant also complies with one of the following conditions:

a. having already endorsed on the licence the aircraft type rating from which the differences are being identified, or

b. having completed the type training requirements for the aircraft from which the differences are being identified.

(iv). The differences training shall have been started and completed within 3 years preceding the application for the new type rating in the same category (case (a)) or in another category (case (b)).

2.0 Aircraft type training levels

The three levels listed below define the objectives, the depth of training and the level of knowledge that the training is intended to achieve.

- **Level 1:** *A brief overview of the airframe, systems and powerplant as outlined in the Systems Description Section of the Aircraft Maintenance Manual/Instructions for Continued Airworthiness.*
  Course objectives: Upon completion of Level 1 training, the student will be able to:
  (a) Provide a simple description of the whole subject, using common words and examples, using typical terms and identify safety precautions related to the airframe, its systems and powerplant;
  (b) Identify aircraft manuals, maintenance practices important to the airframe, its systems and powerplant.
  (c) Define the general layout of the aircraft's major systems;
  (d) Define the general layout and characteristics of the powerplant; (e) Identify special tooling and test equipment used with the aircraft.
- **Level 2:** Basic system overview of controls, indicators, principal components, including their location and purpose, servicing and minor troubleshooting, general knowledge of the theoretical and practical aspects of the subject.
  Course objectives: In addition to the information contained in the Level 1 training, at the completion of Level 2 training, the student will be able to:
  (a) Understand the theoretical fundamentals; apply knowledge in a practical manner using detailed procedures;
  (b) Recall the safety precautions to be observed when working on or near the aircraft, powerplant and systems;

(c) Describe systems and aircraft handling particularly access, power availability and sources.
(d) Identify the locations of the principal components;
(e) Explain the normal functioning of each major system, including terminology and nomenclature.
(f) Perform the procedures for servicing associated with the aircraft for the following systems: Fuel, Power Plants, Hydraulics, Landing Gear, Water/Waste, and Oxygen;
(g) Demonstrate proficiency in use of crew reports and on-board reporting systems (minor troubleshooting) and determine aircraft airworthiness per the MEL/CDL;
(h) Demonstrate the use, interpretation and application of appropriate documentation including instructions for continued airworthiness, maintenance manual, illustrated parts catalogue, etc.

- **Level 3:** Detailed description, operation, component location, removal/installation and bite and troubleshooting procedures to maintenance manual level.

Course objectives: In addition to the information contained in Level 1 and Level 2 training, at the completion of Level 3 training, the student will be able to:
(a) Demonstrate a theoretical knowledge of aircraft systems and structures and interrelationships with other systems, provide a detailed description of the subject using theoretical fundamentals and specific examples and to interpret results from various sources and measurements and apply corrective action where appropriate;
(b) Perform system, powerplant, component and functional checks as specified in the maintenance manual;
(c) Demonstrate the use, interpret, and apply appropriate documentation including structural repair manual, troubleshooting manual, etc.;
(d) Correlate information for the purpose of making decisions in respect of fault diagnosis and rectification to maintenance manual level;
(e) Describe procedures for replacement of components unique to aircraft type.

3.0 Aircraft type training standard

Although aircraft type training includes both theoretical and practical elements, courses can be approved for the theoretical element, the practical element or for a combination of both.
An appropriate training method, or combination of training methods, shall be determined for the entire course or for each of its parts with regard to the scope and objectives of each training phase and taking into consideration the benefits and limitations of the available training methods.
Multimedia-based training (MBT) methods may be used in order to achieve the training objectives either in a physically or in a virtually controlled environment.

3.1 Theoretical element

(a) Objective:

On completion of a theoretical training course the student shall be able to demonstrate, to the levels identified in the Appendix III syllabus, the detailed theoretical knowledge of the aircraft's applicable systems, structure, operations, maintenance, repair, and troubleshooting according to approved maintenance data. The student shall be able to demonstrate the use of manuals and approved procedures, including the knowledge of relevant inspections and limitations.

(b) Level of training:
Training levels are those levels defined in section 2.0 above.
After the first type course for category C certifying staff all subsequent courses need only be to level 1.
During a level 3 theoretical training, level 1 and 2 training material may be used to teach the full scope of the chapter if required. However, during the training most of the course material and training time shall be at the higher level.

(c) Duration
The theoretical training minimum tuition hours are contained in the following table:

Category	**Hours**
Aeroplanes with a maximum certificated take-off mass above 30000kg:	
B1.1	150
B1.2	120
B2	150
C	30
Aeroplanes with a maximum certificated take-off mass equal or less than 30000kg and above 5700kg:	
B1.1	120
B1.2	100
B2	100
C	25
Aeroplanes with a maximum take-off mass of 5700kg and below	
B1.1	80
B1.2	60
B2	60
C	15
Helicopters**	
B1.2	120
B1.4	100
B2	100
c	25

**For non-pressurised piston engine aeroplanes below 2000kg MTOM the minimum duration can be reduced by 50%.*
***For helicopters in group 2 the minimum duration can be reduced by 30%.*

For the purpose of the table above, a tuition hour means 60 minutes of teaching and exclude any breaks, examination, revision, preparation, and aircraft visit.
These hours apply only to theoretical courses for complete aircraft/engine combinations according to the type rating as defined by the Authority.

(d) Justification of course duration:
Training courses carried out in a maintenance training organisation approved in accordance with the Civil Aviation (Approved Training Organization) Regulations and courses directly approved by the Authority shall justify their hour duration and the coverage of the full syllabus by a training needs analysis based on:
- The design of the aircraft type, its maintenance needs, and the types of operation,
- Detailed analysis of applicable chapters – see contents table in point 3.1(e) below,
- Detailed competency analysis showing that the objectives as stated in point 3.1(a) above are fully met.

Where the training needs analysis shows that more hours are needed, course lengths shall be longer than the minimum specified in the table.
Similarly, tuition hours of differences courses or other training course combinations (such as combined B1/B2 courses), and in cases of theoretical type training courses below the figures given in point 3.1(c) above, these shall be justified to the Authority by the training needs analysis as described above.

In addition, the course must describe and justify the following:
- The minimum attendance required to the trainee, in order to meet the objectives of the course.
- The maximum number of hours of training per day, taking into account Pedagogical and human factors principles.

If the minimum attendance required is not met, the certificate of recognition shall not be issued. Additional training may be provided by the training organisation in order to meet the minimum attendance time.

(e) Content:

As a minimum, the elements in the Syllabus below that are specific to the aircraft type shall be covered. Additional elements introduced due to type variations, technological changes, etc. shall also be included.

The training syllabus shall be focused on mechanical and electrical aspects for B1 personnel, and electrical and avionic aspects for B2.

Level / Chapters	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics
Licence category	B1	C	B1	C	B1	C	B1	C	B2
Introduction module:									
05 Time limits/maintenance checks	1	1	1	1	1	1	1	1	1
06 Dimensions/Areas (MTOM, etc.)	1	1	1	1	1	1	1	1	1
07 Lifting and Shoring	1	1	1	1	1	1	1	1	1
08 Levelling and weighing	1	1	1	1	1	1	1	1	1
09 Towing and taxiing	1	1	1	1	1	1	1	1	1
10 Parking/mooring, Storing and Return to Service	1	1	1	1	1	1	1	1	1
11 Placards and Markings	1	1	1	1	1	1	1	1	1
12 Servicing	1	1	1	1	1	1	1	1	1
20 Standard practices — only type particular	1	1	1	1	1	1	1	1	1
Helicopters									
18 Vibration and Noise Analysis (Blade tracking)	—	—	—	—	3	1	3	1	—
60 Standard Practices Rotor	—	—	—	—	3	1	3	1	—
62 Rotors	—	—	—	—	3	1	3	1	1
62A Rotors — Monitoring and indicating	—	—	—	—	3	1	3	1	3
63 Rotor Drives	—	—	—	—	3	1	3	1	1
63A Rotor Drives — Monitoring and indicating	—	—	—	—	3	1	3	1	3
64 Tail Rotor	—	—	—	—	3	1	3	1	1
64A Tail rotor — Monitoring and indicating	—	—	—	—	3	1	3	1	3
65 Tail Rotor Drive	—	—	—	—	3	1	3	1	1
65A Tail Rotor Drive — Monitoring and indicating	—	—	—	—	3	1	3	1	3
66 Folding Blades/Pylon	—	—	—	—	3	1	3	1	—
67 Rotors Flight Control	—	—	—	—	3	1	3	1	—
53 Airframe Structure (Helicopter)	—	—	—	—	3	1	3	1	—
25 Emergency Flotation Equipment	—	—	—	—	3	1	3	1	1

Airframe structures									
51 Standard practices and structures (damage classification, assessment and repair)	3	1	3	1	—	—	—	—	1
53 Fuselage	3	1	3	1	—	—	—	—	1
54 Nacelles/Pylons	3	1	3	1	—	—	—	—	1
55 Stabilisers	3	1	3	1	—	—	—	—	1
56 Windows	3	1	3	1	—	—	—	—	1
57 Wings	3	1	3	1	—	—	—	—	1
52 Doors	3	1	3	1	—	—	—	—	1
Zonal and Station Identification Systems.	1	1	1	1	1	1	1	1	1
Airframe systems:									
21 Air Conditioning	3	1	3	1	3	1	3	1	3
21A Air Supply	3	1	3	1	3	1	3	1	2
21B Pressurisation	3	1	3	1	3	1	3	1	3
21C Safety and Warning Devices	3	1	3	1	3	1	3	1	3
22 Autoflight	2	1	2	1	2	1	2	1	3
23 Communications	2	1	2	1	2	1	2	1	3
24 Electrical Power	3	1	3	1	3	1	3	1	3
25 Equipment and Furnishings	3	1	3	1	3	1	3	1	1
25A Electronic Equipment including emergency equipment	1	1	1	1	1	1	1	1	3

Chapters	turbine		piston		turbine		piston		
Licence category	B1	C	B1	C	B1	C	B1	C	B2
26 Fire Protection	3	1	3	1	3	1	3	1	3
27 Flight Controls	3	1	3	1	3	1	3	1	2
27A Sys. Operation: Electrical/Fly-by-Wire	3	1	—	—	—	—	—	—	3
28 Fuel Systems	3	1	3	1	3	1	3	1	2
28A Fuel Systems — Monitoring and indicating	3	1	3	1	3	1	3	1	3
29 Hydraulic Power	3	1	3	1	3	1	3	1	2
29A Hydraulic Power — Monitoring and indicating	3	1	3	1	3	1	3	1	3
30 Ice and Rain Protection	3	1	3	1	3	1	3	1	3
31 Indicating/Recording Systems	3	1	3	1	3	1	3	1	3
31A Instrument Systems	3	1	3	1	3	1	3	1	3
32 Landing Gear	3	1	3	1	3	1	3	1	2
32A Landing Gear — Monitoring and indicating	3	1	3	1	3	1	3	1	3
33 Lights	3	1	3	1	3	1	3	1	3
34 Navigation	2	1	2	1	2	1	2	1	3
35 Oxygen	3	1	3	1	—	—	—	—	2
36 Pneumatic	3	1	3	1	3	1	3	1	2
36A Pneumatic — Monitoring and indicating	3	1	3	1	3	1	3	1	3
37 Vacuum	3	1	3	1	3	1	3	1	2
38 Water/Waste	3	1	3	1	—	—	—	—	2
41 Water Ballast	3	1	3	1	—	—	—	—	1
42 Integrated modular avionics	2	1	2	1	2	1	2	1	3
44 Cabin Systems	2	1	2	1	2	1	2	1	3
45 On-Board Maintenance System (or covered in 31)	3	1	3	1	3	1	—	—	3
46 Information Systems	2	1	2	1	2	1	2	1	3
47 Nitrogen generation system	3	1	3	1	—	—	—	—	2
50 Cargo and Accessory Compartments	3	1	3	1	3	1	3	1	1
55/57 Flight control surfaces (All)	3	1	3	1	—	—	—	—	1

Turbine Engine									
70 Standard Practices — Engines,	3	1	—	—	3	1	—	—	1
70A constructional arrangement and operation (Installation Inlet, Compressors, Combustion	3	1	—	—	3	1	—	—	1

Level / Chapters	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics
Licence category	B1	C	B1	C	B1	C	B1	C	B2
Section, Turbine Section, Bearings and Seals, Lubrication Systems).									
70B Engine Performance	3	1	—	—	3	1	—	—	1
71 Powerplant	3	1	—	—	3	1	—	—	1
72 Engine Turbine/Turbo Prop/Ducted Fan/Unducted fan	3	1	—	—	3	1	—	—	1
73 Engine Fuel and Control	3	1	—	—	3	1	—	—	1
75 Air	3	1	—	—	3	1	—	—	1
76 Engine controls	3	1	—	—	3	1	—	—	1
78 Exhaust	3	1	—	—	3	1	—	—	1
79 Oil	3	1	—	—	3	1	—	—	1
80 Starting	3	1	—	—	3	1	—	—	1
82 Water Injections	3	1	—	—	3	1	—	—	1
83 Accessory Gear Boxes	3	1	—	—	3	1	—	—	1
84 Propulsion Augmentation	3	1	—	—	3	1	—	—	1
73A FADEC	3	1	—	—	3	1	—	—	3
74 Ignition	3	1	—	—	3	1	—	—	3
77 Engine Indicating Systems	3	1	—	—	3	1	—	—	3
49 Auxiliary Power Units (APUs)	3	1	—	—	—	—	—	—	2

Piston Engine									
70 Standard Practices — Engines	—	—	3	1	—	—	3	1	1
70A Constructional arrangement and operation (Installation, Carburettors, Fuel injection systems, Induction, Exhaust and Cooling Systems, Supercharging/Turbochargin, Lubrication Systems).	—	—	3	1	—	—	3	1	1
70B Engine Performance	—	—	3	1	—	—	3	1	1
71 Powerplant	—	—	3	1	—	—	3	1	1
73 Engine Fuel and Control	—	—	3	1	—	—	3	1	1
76 Engine Control	—	—	3	1	—	—	3	1	1
79 Oil	—	—	3	1	—	—	3	1	1
80 Starting	—	—	3	1	—	—	3	1	1
81 Turbines	—	—	3	1	—	—	3	1	1
82 Water Injections	—	—	3	1	—	—	3	1	1
83 Accessory Gear Boxes	—	—	3	1	—	—	3	1	1
84 Propulsion Augmentation	—	—	3	1	—	—	3	1	1
73A FADEC	—	—	3	1	—	—	3	1	3
74 Ignition	—	—	3	1	—	—	3	1	3
Level **Chapters**	**Aeroplanes turbine**		**Aeroplanes piston**		**Helicopters turbine**		**Helicopters piston**		**Avionics**
Licence category	**B1**	**C**	**B1**	**C**	**B1**	**C**	**B1**	**C**	**B2**
77 Engine Indication Systems	—	—	3	1	—	—	3	1	3
Propellers									
60A Standard Practices — Propeller	3	1	3	1	—	—	—	—	1
61 Propellers/Propulsion	3	1	3	1	—	—	—	—	1
61A Propeller Construction	3	1	3	1	—	—	—	—	—
61B Propeller Pitch Control	3	1	3	1	—	—	—	—	—
61C Propeller Synchronising	3	1	3	1	—	—	—	—	1
61D Propeller Electronic control	2	1	2	1	—	—	—	—	3
61E Propeller Ice Protection	3	1	3	1	—	—	—	—	—
61F Propeller Maintenance	3	1	3	1	—	—	—	—	1

(f) Multimedia Based Training (MBT) methods may be used to satisfy the theoretical training element either in the classroom or in a virtual controlled environment subject to the acceptance of the Authority approving the training course.

3.2 Practical element

(a) Objective:

The objective of practical training is to gain the required competence in performing safe maintenance, inspections, and routine work according to the maintenance manual and other relevant instructions and tasks as appropriate for the type of aircraft, for example troubleshooting, repairs, adjustments, replacements, rigging and functional checks. It includes the awareness of the use of all technical literature and documentation for the aircraft, the use of specialist/special tooling and test equipment for performing removal and replacement of components and modules unique to type, including any on- wing maintenance activity.

(b) Content:

At least 50% of the crossed items in the table below, which are relevant to the aircraft type, shall be completed as part of the practical training.

Tasks crossed represent subjects that are important for practical training purposes to ensure that the operation, function, installation, and safety significance of key maintenance tasks are adequately addressed; particularly where these cannot be fully explained by theoretical training alone. Although the list details the minimum practical training subjects, other items may be added where applicable to the particular aircraft type.

Tasks to be completed shall be representative of the aircraft and systems both in complexity and in the technical input required to complete that task. While relatively simple tasks may be included, other more complex tasks shall also be incorporated and undertaken as appropriate to the aircraft type.

If it exists, the minimum list of practical tasks of the operational suitability data (OSD), established, shall be part of the practical elements to be selected.

Glossary of the table below:

LOC: Location;
FOT: Functional /Operational Test;
SGH: Service and Ground Handling;
R/I: Removal / Installation;
MEL: Minimum Equipment List;
TS: Troubleshooting.

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
Introduction Module:											
05 Time limits/ maintenance checks	X/X	-	-	-	-	-	-	-	-	-	-
06 Dimensions/ Areas (MTOM, etc)	X/X	-	-	-	-	-	-	-	-	-	-
07 Lifting and Shoring	X/X	-	-	-	-	-	-	-	-	-	-
08 Levelling and weighing	X/X	-	X	-	-	-	-	X	-	-	-
09 Towing and taxiing	X/X	-	X	-	-	-	-	X	-	-	
10 Parking/ mooring, Storing & Return to Service	X/X	-	X	-	-	-	-	X	-	-	-
11 Placards and Markings	X/X	-	X	-	-	-	-	-	-	-	-
12 Servicing	X/X	-	X	-	-	-	-	X	-	-	-
20 Standard practices – only type particular	X/X	-	X	-	-	-	-	X	-	-	-
Helicopters											
18 Vibration and Noise Analysis (Blade tracking)	X/-	-	-	-	-	X	-	-	-	-	-
60 Standard Practices Rotor – only type specific	X/X	-	X	-	-	-	-	-	-	X	-
62 Rotors	X/-	-	X	X	-	X	-	-	-	X	-
62A Rotors - Monitoring and indicating	X/X	X	-	X	X	X	-	-	-	-	X
63 Rotor Drives	X/-	X	-	-	-	X	-	-	-	X	-
63A Rotor Drives – Monitoring and indicating	X/X	X	-	X	X	X	-	-	-	-	X
64 Tail Rotor	X/-	-	X	-	-	X	-	-	-	X	-
64A Tail Rotor – Monitoring and indicating	X/X	X	-	X	X	X	-	-	-	-	X
65 Tail Rotor Drive	X/-	X	-	-	-	X	-	-	-	-	-
65A Tail Rotor Drive – Monitoring and indicating											
66 Folding Blades/ Pylon											
67 Rotors Flight Control											
53 Airframe Structure (Helicopter)											
Note: covered under Airframe structures											
25 Emergency Flotation Equipment	X/X	X	X	X	X	X	X	X	-	-	-
Airframe Structures											
51 Standard practices and structures (damage classification, assessment and repair)											
53 Fuselage	X/-	-	-	-	-	X	-	-	-	-	-
54 Nacelles/ Pylons	X/-	-	-	-	-	-	-	-	-	-	-
55 Stabilisers	X/-	-	-	-	-	-	-	-	-	-	-
56 Windows	X/-	-	-	-	-	X	-	-	-	-	-
57 Wings	X/-	-	-	-	-	-	-	-	-	-	-
27A Flight Control Surfaces	X/-	-	-	-	-	X	-	-	-	-	-
52 Doors	X/X	X	X	-	-	-	-	X	-	-	-
Airframe Systems											
21 Air Conditioning	X/X	X	X	-	X	X	X	X	-	X	X
21A Air Supply	X/X	X	-	-	-	-	X	-	-	-	-
21B Pressurisation	X/X	X	-	-	X	X	X	-	-	X	X
21C Safety & Warning Devices	X/X	-	X	-	-	-	X	-	-	X	-

	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
22 Autoflight	X/X	-	-	-	X	-	X	X	X	X	X
23 Communications	X/X	-	X	-	X	-	X	X	X	X	X
24 Electrical Power	X/X	X	X	X	X	X	X	X	X	-	X
25 Equipment & Furnishings	X/X	X	X	X	-	-	X	X	X	-	-
25A Electronic Equipment including emergency equipment	X/X	X	X	X	-	-	X	X	-	-	-
26 Fire Protection	X/X	X	X	X	X	X	X	X	X	X	X
27 Flight Controls	X/X	X	X	X	X	X	X	-	-	X	-
27A Sys. Operation: Electrical/ Fly-by-wire	X/X	X	X	X	X	-	X	-	-	-	X
28 Fuel Systems	X/X	X	X	X	X	X	X	X	-	X	-
28A Fuel Systems – Monitoring and indicating	X/X	X	-	-	-	-	X	-	X	-	X
29 Hydraulic Power	X/X	X	X	X	X	X	X	X	-	X	-
29A Hydraulic Power – Monitoring and indicating	X/X	X	-	X	X	X	X	-	X	X	X
30 Ice & Rain Protection	X/X	X	X	-	X	X	X	X	-	X	X
31 Indicating/ Recording Systems	X/X	X	X	X	X	X	X	X	X	X	X
31A Instrument Systems	X/X	X	X	X	X	X	X	X	X	X	X
32 Landing Gear	X/X	X	X	X	X	X	X	X	X	X	-
32A Landing Gear – Monitoring and indicating	X/X	X	-	X	X	X	X	-	X	X	X
33 Lights	X/X	X	X	-	X	-	X	X	X	X	-
34 Navigation	X/X	-	X	-	X	-	X	X	X	X	X
35 Oxygen	X/-	X	X	X	-	-	X	X	-	-	-
36 Pneumatic	X/-	X	-	X	X	X	X	-	X	X	X
36A Pneumatic – Monitoring and indicating	X/X	X	X	X	X	X	X	X	X	X	X
37 Vacuum	X/-	X	-	X	X	X	-	-	-	-	-
38 Water/ Waste	X/-	X	X	-	-	-	X	X	-	-	-
41 Water Ballast	X/-	-	-	-	-	-	-	-	-	-	-
42 Integrated modular avionics	X/X	-	-	-	-	-	X	X	X	X	X
44 Cabin Systems	X/X	-	-	-	-	-	X	X	X	X	X
45 On-Board Maintenance Systems (or covered in 31)	X/X	X	X	X	X	X	X	X	X	X	X
46 Information Systems	X/X	-	-	-	-	-	X	-	X	X	X
50 Cargo and Accessory components	X/X	-	X	-	-	-	-	-	-	-	-
Turbine/ Piston Engine Module:											
70 Standard Practices – Engines,	-	-	X	-	-	-	-	X	-	-	-
70A Constructional arrangement and operation (Installation Inlet, Compressors, Combustion Section, Turbine Section, Bearings and Seals, Lubrication Systems)	X/X	-	-	-	-	-	-	-	-	-	-
Turbine Engines:											
70B Engine Performance	-	-	-	-	-	-	X	-	-	-	-
71 Powerplant	X/-	X	X	-	-	-	-	X	-	-	-
72 Engine Turbine/ Turbo Prop/ Ducted Fan/ Inducted Fan	X/-	-	-	-	-	-	-	-	-	-	-
73 Engine Fuel and Control	X/X	X	-	-	-	-	-	-	-	-	-
73A FADEC	X/X	X	-	X	X	X	X	-	X	X	X
74 Ignition	X/X	X	-	-	-	-	X	-	-	-	-
75 Air	X/-	-	-	X	-	X	-	-	-	-	-
76 Engine Controls	X/-	X	-	-	-	X	-	-	-	-	-
77 Engine Indicating Systems	X/X	X	-	-	X	X	X	-	-	X	X

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
78 Exhaust	X/-	X	-	-	X	-	-	-	-	-	-
79 Oil	X/-	-	X	X	-	-	-	-	-	-	-
80 Starting	X/-	X	-	-	X	X	-	-	-	-	-
82 Water Injections	X/-	X	-	-	-	-	-	-	-	-	-
83 Accessory Gear Boxes	X/-	-	X	-	-	-	-	-	-	-	-
84 Propulsion Augmentation	X/-	X	X	-	-	X	-	-	-	-	-
Auxiliary Power Units (APUs):											
49 Auxiliary Power Units (APUs)	X/-	X	X	-	-	X	-	-	-	-	-
Piston Engines:											
70 Standard Practices – Engines – only type particular	-	-	X	-	-	-	-	X	-	-	-
70A constructional arrangement and operation (Installation, Carburettors, Fuel injection systems, Injection, Exhaust and Cooling Systems, Supercharging/ Turbocharging, Lubrication Systems)	X/X	-	-	-	-	-	-	-	-	-	-
70B Engine Performance	-	-	-	-	-	X	-	-	-	-	-
71 Powerplant	X/-	X	X	-	-	-	-	X	-	-	-
73 Engine Fuel and Control	X/X	X	-	-	-	-	-	-	-	-	-
73A FADEC	X/X	X	-	X	X	X	X	X	X	X	X
74 Ignition	X/X	X	-	-	-	-	X	-	-	-	-
76 Engine Controls	X/-	X	-	-	-	X	-	-	-	-	-
77 Engine Indicating	X/X	X	-	-	X	X	X	-	-	X	X
78 Exhaust	X/-	X	-	-	X	X	-	-	-	-	-
79 Oil	X/-	-	X	X	-	-	-	-	-	-	-
80 Starting	X/-	X	-	-	X	X	-	-	-	-	-
81 Turbines	X/-	X	X	X	-						
82 Water Injection	X/-	X	-	-	-	-	-	-	-	-	-
83 Accessory Gearboxes	X/-	-	X	X	-	-	-	-	-	-	-
84 Propulsion Augmentation	X/-	X	-	-	-	-	-	-	-	-	-
Propellers:											
60A Standard Practices – Propeller	-	-	-	X	-	-	-	-	-	-	-
61 Propellers/ Propulsion	X/X	X	X	-	X	X	-	-	-	-	-
61A Propeller Construction	X/X	-	X	-	-	-	-	-	-	-	-
61B Propeller Pitch Control	X/-	X	-	X	X	X	-	-	-	-	-
61C Propeller Synchronisation	X/-	X	-	-	-	X	-	-	-	X	-
61D Propeller Electronic Control	X/X	X	X	X	X	X	X	X	X	X	X
61E Propeller Ice Protection	X/-	X	-	X	X	X	-	-	-	-	-
61F Propeller Maintenance	X/X	X	X	X	X	X	X	X	X	X	X

1.0 Type training examination and assessment standard

4.1 Theoretical element and assessment standard

After the theoretical portion of the aircraft type training has been completed, a written examination shall be performed, which shall comply with the following:

(a) Format of the examination is of the multiple-choice type. Each multiple-choice question shall have at least 3 alternative answers of which only one shall be the correct answer. The total time is based on the total number of questions and the time for answering is based upon a nominal average of 90 seconds per question.
(b) The incorrect alternatives shall seem equally plausible to anyone ignorant of the subject. All the alternatives shall be clearly related to the question and of similar vocabulary, grammatical construction, and length.
(c) In numerical questions, the incorrect answers shall correspond to procedural errors such as the use of incorrect sense (+ versus -) or incorrect measurement units. They shall not be mere random numbers.
(d) The level of examination for each chapter (*) shall be the one defined in point 2 "Aircraft type training levels". However, the use of a limited number of questions at a lower level is acceptable.
(e) The examination shall be of the closed book type. No reference material is permitted. An exception will be made for the case of examining a B1 or B2 candidate's ability to interpret technical documents.
(f) The number of questions shall be at least 1 question per hour of instruction. The number of questions for each chapter and level shall be proportionate to:

- he effective training hours spent teaching at that chapter and level;
- The learning objectives as given by the training needs analysis.

The Authority will assess the number and the level of the questions when approving the course.
(g) The minimum examination pass mark is 75 %. When the type training examination is split in several examinations, each examination shall be passed with at least a 75% mark. In order to be possible to achieve exactly a 75% pass mark, the number of questions in the examination shall be a multiple of 4.
(h) Penalty marking (negative points for failed questions) is not to be used.
(i) End of module phase examinations cannot be used as part of the final examination unless they contain the correct number and level of questions required.

(*) For the purpose of this point 4, a "chapter" means each one of the rows preceded by a number in the table contained in point 3.1(e).

2.2 Practical element examination standard

After the practical element of the aircraft type training has been completed, an assessment must be performed, which must comply with the following:
(a) The assessment shall be performed by designated assessors appropriately qualified.
(b) The assessment shall evaluate the knowledge and skills of the trainee.

5.0 Type evaluation standard for Group 2 and Group 3 aircraft

Type evaluation relative to aircraft of Group 2 or Group 3 shall be conducted by training organisations appropriately approved in accordance with (Approved Training Organization) Regulations or Authority.

The evaluation shall consist of practical assessment and oral examination and comply with the following requirements:

(a) The practical assessment shall determine the candidate's competence to perform maintenance tasks applicable to the particular aircraft type.

(b) The oral examination shall be on a sample of chapters drawn from point 3. 'Aircraft type training standard', at the indicated level in point 3.1(e).

(c) Both oral examinations and practical assessments shall ensure that the following objectives are met:

1. properly discuss with confidence the aircraft type and its systems;
2. ensure safe performance of maintenance, inspections, and routine work according to the maintenance manual and other relevant instructions and tasks as appropriate for the type of aircraft, for example, troubleshooting, repairs, adjustments, replacements, rigging and functional checks such as engine run, etc., if required.
3. correctly use all technical literature and documentation for the aircraft;
4. correctly use specialist/special tooling and test equipment, perform removal and replacement of components and modules unique to type, including any on-wing maintenance activity.

(d) The following conditions apply to the type evaluation:

1. The maximum number of attempts for each examination is three in a 12-month period. A waiting period of 30 days is required after the first failed attempt within one set, and a waiting period of 60 days is required after the second failed attempt. The applicant shall confirm in writing to the maintenance training organisation or the competent authority to which they apply for an examination, the number, and dates of attempts during the last 12-month period and the maintenance training organisation or the competent authority where these attempts took place. The maintenance training organisation or the competent authority is responsible for checking the number of attempts within the applicable time frames.
2. The type evaluation shall be passed, and the required practical experience shall be completed within the 3 years preceding the application for the rating endorsement on the aircraft maintenance licence.
3. Type evaluation shall be performed with at least one examiner present. The examiner(s) shall not have been involved in the applicant's training.

(e) A written and signed report shall be prepared and made available to the candidate by the examiner(s) to explain why the candidate has passed or failed.

6.0 On the Job Training

6.1 General

The OJT is the training that the applicant is given on a particular aircraft type in a real workplace, having the possibility to learn maintenance best practices and correct release-to-service procedures. On-the-Job Training (OJT) shall be approved by Authority. The OJT shall comply with the following requirements:

(a) The list of the OJT tasks and programme shall be accepted by the competent authority which has issued the maintenance licence before starting the OJT training.
(b) The OJT shall be conducted at one or more maintenance organisations appropriately approved according to this Regulation for the maintenance of that aircraft type. One of those organisations shall control the OJT.
(c) The applicant shall have a category A, B licence before undergoing the OJT or have finished the theoretical type training and cumulated at least 50 % of the basic experience requirement as regards the category of aircraft he or she is trained for.
(d) The applicant shall start and complete the OJT within 3 years preceding the application for the first type rating endorsement. At least 50 % of the OJT tasks shall take place after the related aircraft theoretical type training has been completed.
(e) The applicant shall undergo the OJT under the mentorship of a qualified mentor or mentors, on a one-to- one supervision basis, during which the mentors verify the technical knowledge, the skills, and responsibilities of a typical certifying staff. During the OJT, the mentors transmit also knowledge and experience to the applicant, providing the necessary advice, support, and guidance.
(f) Each task shall be signed off by the applicant and refer to an actual job card/work sheet, etc. The mentors shall verify and countersign off the tasks performed during the OJT, because they shall assume the responsibility for the tasks at support staff or certifying staff level, as applicable, depending on the release-to-service procedure.
(g) At the satisfactory completion of the OJT programme, the mentors shall issue a recommendation for the final assessment of the applicant to be conducted by designated assessors.

6.2 OJT content and OJT logbook

The OJT shall include a series of activities and tasks representative of the aircraft type rating, systems, and licence category applied for and may cover more than one licence category.

The OJT shall be documented in an OJT logbook reporting the following:
(a) name of the applicant;
(b) date of birth of the applicant;
(c) the approved maintenance organisation(s) where the OJT was carried out;
(d) aircraft rating and licence categories applied for;
(e) list of tasks, including:

i. task description;
ii. reference to job card/work order/aircraft tech log, etc.
iii. location of task completion
iv. date of task completion v. aircraft registration(s).

(f) names of the mentors (including licence number, if applicable);
(g) a signed recommendation of the mentors for the successive final assessment of the applicant

6.3 Final assessment of the applicant

The final assessment of the applicant may only be performed once the OJT logbook has been completed and the mentors have signed the related recommendation.

The designated assessor(s) conducting the final assessment shall notify the date of the assessment to the licensing authority well in advance to allow a possible participation of the authority.

The objective of the final assessment is to verify that the applicant has sufficient technical knowledge as well as the appropriate skills and attitude and that he or she is competent to work independently as type-rated certifying staff on a particular aircraft type.

The final assessment shall have a minimum duration of one working day.

(a)The assessment shall sample:

1. the general technical knowledge required for the particular licence category;
2. the aircraft-type-specific knowledge and skills for the particular licence category;
3. the understanding of the licence privileges relevant to the aircraft and to the licence category;
4. the appropriate behaviour and safety attitude of the applicant in relation to the maintenance environment.

(b) The assessment shall be recorded in a report containing the following information.

1. identification data of the applicant;
2. identification data of the assessor(s);
3. date and time frame of the assessment;
4. content of the assessment;
5. result of the assessment: Passed or Failed.
6. signature of the assessor(s), the candidate and, if applicable, the independent observer(s).

(c) A failed assessment may be retaken after 3 months or, if additional training has been received and a new recommendation by the mentors has been made, earlier than 3 months if agreed by the assessor(s). After three failed attempts, the complete OJT shall be repeated.

6.4 Requirements for mentors and assessors

Mentors and assessors are maintenance staff with the following qualifications

(i) Mentors:

- hold a valid aircraft maintenance licence (AML) issued in accordance with this Annex or a valid and fully compliant with ICAO Annex 1 AMEL in accordance with The Civil Aviation (Personnel Licencing) Regulations acceptable to the Authority;

- have been holding, for at least 1 year, an AMEL in the same category, when compared to the one for which the OJT is being mentored, that is endorsed with a type rating appropriate to exercise the privileges on the related aircraft;

- have the necessary release or sign-off privileges in the maintenance organisation where the OJT is performed;

- have experience in training other people (such as being apprenticeship instructors, instructors in accordance with ATO requirements, having received train-the trainer courses or having any other comparable national qualification, or having a training to do so that is acceptable to the Authority

(ii) Assessors of the final assessment:

- hold a valid aircraft maintenance licence (AML) issued in accordance with this Annex or a valid and fully compliant with ICAO Annex 1 AMEL in accordance with The Civil Aviation (Personnel Licencing) Regulations acceptable to the Authority;
- have been holding, for at least 3 years, an AML in the same category, when compared to the one for which the OJT is being assessed, endorsed with the same or similar aircraft type rating.
- have experience and/or have received training in assessing others (such as being apprenticeship instructors, examiners in accordance with ATO requirements having received train-the-trainer courses, or having any other comparable national qualification, or having a training to do so that is acceptable to the competent authority);
- shall not have been involved as a mentor of the applicant in the OJT; when the assessor has taken part in the OJT performance, then an independent observer shall be present during the OJT assessment.
-

6.5 OJT documentation and records

The satisfactory accomplishment of the OJT shall be attested to the applicant with the final assessment report and the OJT logbook.

The OJT documentation shall be provided to the authority to support the application for the issue or change of the licence.

Records of the OJT documentation shall be kept by the maintenance organisation where the OJT is conducted, in accordance with the procedures agreed with the authority of the maintenance organisation.

AMC to Section 1.0 of Appendix III to AMEL Manual
"Aircraft Type Training and Type Evaluation Standard. On-the-Job Training (OJT) Section 1"

Aircraft Type Training

1. Aircraft type training may be sub-divided in airframe and/or powerplant and/or avionics/electrical systems type training courses
   - Airframe type training course means a type training course including all relevant aircraft structure and electrical and mechanical systems excluding the powerplant.
   - Powerplant type training course means a type training course on the bare engine, including the build-up to a quick engine change unit.
   - The interface of the engine/airframe systems should be addressed by either airframe or powerplant type training course. In some cases, such as for general aviation, it may be more appropriate to cover the interface during the airframe course due to the large variety of aircraft that can have the same engine type installed.
   - Avionics/electrical systems type training course means type training on avionics and electrical systems covered by but not necessarily limited to ATA (Air Transport Association) Chapters 22, 23, 24, 25, 27, 31, 33, 34, 42, 44, 45, 46, 73 and 77 or equivalent.
2. Practical training may be performed either following or integrated with the theoretical elements. However, it should not be performed before theoretical training.
3. The content of the theoretical and practical training should:
   - address the different parts of the aircraft which are representative of the structure, the systems/components installed and the cabin; and
   - Include training on the use of technical manuals, maintenance procedures and the interface with the operation of the aircraft.

   Therefore, it should be based on the following elements:
   - Type design including relevant type design variants, new technology and techniques;
   - Feedback from in-service difficulties, occurrence reporting, etc;
   - Significant applicable airworthiness directives and service bulletins;
   - Known human factor issues associated with the particular aircraft type;
   - Use of common and specific documentation, (when applicable, such as MMEL, AMM, MPD, TSM, SRM, WD, AFM, tool handbook), philosophy of the troubleshooting, etc.;
   - Knowledge of the maintenance on-board reporting systems and ETOPS maintenance. Conditions where applicable;
   - Use of special tooling and test equipment and specific maintenance practises including critical safety items and safety precautions;
   - Significant and critical tasks/aspects from the MMEL, CDL, Fuel Tank Safety (FTS), airworthiness limitation items (ALI) including Critical Design Configuration Control Limitations (CDCCL), CMR and all ICA documentation such as MRB, MPD, SRM, AMM, etc., when applicable.

- Maintenance actions and procedures to be followed as a consequence of specific certification requirements, such as, but not limited to, RVSM (Reduced Vertical Separation Minimum) and NVIS (Night Vision Imaging Systems);
- Knowledge of relevant inspections and limitations as applicable to the effects of Environmental factors or operational procedures such as cold and hot climates, wind, moisture, sand, de-icing / anti-icing, etc.

  The type training does not necessarily need to include all possible customer options corresponding to the type rating described in the Appendix I to AMC to this manual.

4. Limited avionic system training should be included in the category B1 type training as the B1 privileges include work on avionics systems requiring simple tests to prove their serviceability.
5. Electrical systems should be included in both categories of B1 and B2 type training.
6. The theoretical and practical training should be complementary and may be:
   - Integrated or split
   - supported by the use of training aids, such as trainers, virtual aircraft, aircraft components, maintenance simulation training devices (MSTDs) and maintenance training devices (MTDs)

Maintenance Simulation Training Devices (MSTDs) - A training device that is intended to be used in maintenance training, examination, and/or assessment for a component, system or entire aircraft. The MSTD may consist of hardware and software elements.

Maintenance Training Devices (MTDs) - Maintenance training device is any training device other than an MSTD used for maintenance training and/or examination and/or assessment. It may include mock-ups.

7. The integration and usage of MSTDs and MTDs, as defined above, in maintenance type training (theoretical and/or practical) should consider the following:

- The use of actual aircraft components should be allowed for any MSTD or MTD, even if the components are in a non-airworthy condition.
- The complexity and degree of simulation for an MSTD may vary and should support type training elements that address a component, a system or the entire aircraft. Based on its characteristics and capabilities, the MSTD may be:
- a training device capable of providing, for the respective component or system, the representation of aircraft location, access and layout, and for servicing with an acceptable level of accuracy and limited simulation; or
- a training device capable of providing, for the respective component or system, the representation of aircraft location, access and layout with sufficient accuracy and with interactive simulation for servicing, and the applicable maintenance data for operational (O) and functional (F) test elements including built-in test (BIT) initiation and monitoring from outside the cockpit; such representation should have the capability to accommodate some troubleshooting scenarios; or

- a training device capable of providing, for the respective component or system, the representation of onboard (flight deck/cockpit or cabin) indication and controls with an acceptable level of accuracy and limited interactive simulation; or − a training device capable of providing, for the respective component or system, the representation of onboard (flight deck/cockpit or cabin) indication and controls with sufficient accuracy and with interactive simulation for servicing, and the applicable maintenance data for operational (O) and functional (F) test elements including built-in test (BIT) initiation and monitoring; such representation should have the capability to accommodate some troubleshooting scenarios; or
- any combination of the above.
- Flight simulation training devices (FSTDs) may be used as MSTDs whenever their characteristics and capabilities are considered appropriate for, and supportive of, the delivery of the respective maintenance training element(s).
- An MTD is any training device other than an MSTD used for maintenance training and/or examination and/or assessment.

AMC to Paragraphs 1(b), 3.2 and 4.2 of Appendix III to AMEL Manual

"Aircraft Type Training and Examination Standard. On-the-Job Training"

Practical Element of the Aircraft Type Training

1. The practical training may include instruction in a classroom or in simulators, but part of the practical training should be conducted in a real maintenance or manufacturer environment.
2. The tasks should be selected because of their *frequency, complexity, variety, safety, criticality, novelty*, etc. The selected tasks should cover all the chapters described in the table contained in paragraph 3.2 of Appendix III to AMEL Manual.
3. The duration of the practical training should ensure that the content of training required by paragraph 3.2 of Appendix III to AMEL Manual is completed. Nevertheless, for aeroplanes with a MTOM equal or above 30000kg, the duration for the Practical element of a type rating training course should not be less than two weeks unless a shorter duration meeting the objectives of the training and taking into account pedagogical aspects (maximum duration per day) is justified to the Authority.
4. The organisation providing the practical element of the type training should provide trainees with a schedule or plan indicating the list of tasks to be performed under instruction or supervision. A record of the tasks completed should be entered into a logbook which should be designed such that each task or group of tasks be countersigned by the designated assessor. The logbook format and its use should be clearly defined.
5. In paragraph 4.2 of Appendix III to AMEL Manual, the term "designated assessors appropriately qualified" means that the assessors should demonstrate training and experience on the assessment process being undertaken and be authorised to do so by the organisation. Further guidance about the assessment and the designated assessors is provided in Appendix III to AMC to AMEL Manual.

6. The practical element (for powerplant and avionics systems) of the Type Rating Training may be subcontracted by the approved Training organisation under its quality system according to the provisions of the Civil Aviation (Approved Maintenance Organisations) Regulations and the corresponding Guidance Material.

AMC to Paragraph 1(c) of Appendix III to AMEL Manual

"Aircraft Type Training and Examination Standard. On-the-Job Training"

Differences Training
Approved difference training is not required for different variants within the same aircraft type rating (as specified in Appendix I to AMC to AMEL Manual) for the purpose of type rating endorsement on the Aircraft Maintenance Engineers' Licence.
However, this does not necessarily mean that no training is required before a certifying staff authorisation can be issued by the maintenance organisation (refer to AMC AMEL.A.20 (b) (3).

GM1 to Appendix III Aircraft type training and type evaluation standard — on-the-job training (OJT) Section 1(c)

DIFFERENCES TRAINING
If the holder of a B1 and B2 licence, without any type rating, successfully completes a combined type training course (B1 + B2) followed by an OJT tailored only to B1 tasks, they can obtain only the type rating endorsement that is applicable to the B1 subcategory.
Within the next 3 years from the completion of the combined training course, endorsement of the aircraft type for the B2 category is possible after carrying out an OJT programme limited to the tasks relevant to the B2 category only.
When instead, the aircraft type endorsement would be requested after more than 3 years, the applicant would be required to also pass a differences type training course (from B1 to B2) plus the OJT programme limited to the tasks relevant to the B2 category only. All common theoretical and practical elements, and OJT tasks, already demonstrated as B1, shall be considered fulfilled.

AMC1 Appendix III Aircraft type training and type evaluation standard — on-the-job training (OJT) Section 3

Aircraft Type Training Standard
Training methods are categorised as 'instructor-centred', 'student-centred' and 'blended training'. The actual training method and the training tools should be adapted to suit the training subject and be chosen considering their intrinsic characteristics, such as but not limited to their efficiency and the pedagogical benefits of the method/tool.
A complex or critical subject should not normally be taught solely through a student-centred method unless provisions are in place to verify the actual and progressive acquisition of knowledge of the student.

Complex and critical areas should be identified by the training needs analysis (TNA). The complexity and criticality of the areas could differ on a case-by-case basis (that is, areas proven to be critical by organisations' 'in-service events', occurrence reporting, human factors, safety, etc.), but should in any case cover the maintenance areas with special emphasis (MASE) identified by the type-certificate holder (TCH) in its operational suitability data (OSD).

AMC to Paragraph 3.1(d) of Appendix III to AMEL "Aircraft Type Training and Type Evaluation Standard. On-the-Job Training (OJT)"

Training Needs Analysis (TNA) for the Theoretical Element of the Aircraft Type Training

1. The minimum duration for the theoretical element of the type rating training course, as described in Appendix III to this manual, has been determined based on:
   - Generic categories of aircraft and minimum standard equipment fit.
   - The estimated average duration of international standard.
2. The purpose of the Training Needs Analysis (TNA) is to adapt and justify the duration of the course for a specific aircraft type. This means that the TNA is the main driver for determining the duration of the course, regardless of whether it is above or below the minimum duration described in Appendix III to this manual.
   For the type training courses approved and conducted on the basis of the previous requirements valid before the requirement of this manual and having a duration for the theoretical element equal to or above the minimum duration contained in paragraph 3.1(c) of Appendix III to this manual, it is acceptable that the TNA only covers the differences introduced by in paragraph 3.1(e) "Content" and the criteria introduced in paragraph 3.1(d) "Justification of course duration" related to the minimum attendance and the maximum number of training hours per day. This TNA may result in a change in the duration of the theoretical element.

3. The content and the duration deriving from this TNA may be supported by an analysis from the Type Certificate holder.
4. In order to approve a reduction of such minimum duration, the evaluation done by the Authority should be performed on a case-by-case basis appropriate to the aircraft type.
   For example,
   a) while it would be exceptional for a theoretical course for a large transport category aircraft such as an A330 or B757 to be below the minimum duration shown, it would not necessarily be exceptional in the case of a General Aviation (GA) business aircraft such as a Learjet 45 or similar. Typically, the TNA for a GA aircraft course would demonstrate that a course of a shorter duration satisfies the requirements.
   b) The use of an MSTD (i.e. flat panel trainer) comprising aircraft-type-specific software may result in the duration of the training being reduced due to a more effective transfer of knowledge.

c) The use of multimedia-based training (MBT), or blending the training methods, may improve the efficiency of the training and, consequently, contribute to the reduction of the overall time needed to achieve the learning objectives.

5. When developing the TNA, the following should be considered:

a) The TNA should include an analysis identifying all the areas and elements where there is a need for training as well as the associated learning objectives, considering the design philosophy of the aircraft type, the operational environment, the type of operations and the operational experience. This analysis should be written in a manner, which provides a reasonable understanding of which areas and elements constitute the course in order to meet the learning objectives.
b) As a minimum, the Training Need Analysis (TNA) should take into account all the applicable elements contained in paragraph 3.1 of AMEL Manual Appendix III and associated AMCs.
c) The TNA should set-up the course content considering the Appendix III objectives for each level of training and the prescribed topics in the theoretical element table contained in paragraph 3.1 of AMEL Manual Appendix III.
d) For each chapter described in the theoretical element table contained in paragraph 3.1 of AMEL Manual Appendix III, the corresponding training time should be recorded.
e) Typical documents to be used in order to identify the areas and elements where there is a need for training typically include, among others, the Aircraft Maintenance Manual, MRB report, CMRs, airworthiness limitations, Troubleshooting Manual, Structural Repair Manual, Illustrated Parts Catalogue, Airworthiness Directives and Service Bulletins.
f) During the analysis of these documents:

- Consideration should be given to the following typical activities:
  -Activation/reactivation;
  -Removal/Installation;
  -Testing;
  -Servicing;
  -Inspection, check and repairs;
  -Troubleshooting / diagnosis.

- For the purpose of identifying the specific elements constituting the training course, it is acceptable to use a filtering method based on criteria such as:
  -Frequency of the task;
  -Human factor issues associated to the task;
  -Difficulty of the task;
  -Criticality and safety impact of the task;
  -In-service experience;
  -Novel or unusual design features (not covered by AMEL Manual Appendix I);
  -Similarities with other aircraft types;
  -Special tests and tools/equipment.

- It is acceptable to follow an approach based on:
  -Tasks or groups of tasks, or
  -Systems or subsystems or components

g) The TNA Should:
- Identify the learning objectives for each task, group of tasks, system, subsystem, or component;
- Associate the identified tasks to be trained to the regulatory requirements (table in Paragraph 3.1 of Appendix III to AMEL Manual);
- Organise the training into modules in a logical sequence (adequate combination of chapters as defined in Appendix III of AMEL Manual);
- Determine the sequence of learning (within a lesson and for the whole syllabus);
- Identify the scope of information and level of detail with regard to the minimum standard to which the topics of the training needs assessment (TNA) should be taught according to the set-up objectives.
- Address the following:
  -Description of each system/component including the structure (where applicable);
  -System/component operation taking into account:
    a. Complexity of the system (e.g., the need of further break down into subsystems, etc.);
    b. Design specifics, which may require more detailed presentation or may contribute to maintenance errors;
    c. Normal and emergency functioning;
    d. Troubleshooting;
    e. Interpretation of indications and malfunctions;
    f. Use of maintenance publications;
    g. Identification of special tools and equipment required for servicing and maintaining the aircraft;
    h. Maintenance Practices;
    i. Routine inspections, functional or operational tests, rigging/adjustment, etc.
- Describe the following:
  -The instructional methods and equipment, teaching methods and blending of the teaching methods in order to ensure the effectiveness of the training;
  -The maintenance training documentation/material to be delivered to the student;
  -Facilitated discussions, questioning session, additional practiced-oriented training, etc.;
  -The homework, if developed;
  -The training provider's resources available to the learner.

h) It is acceptable to differentiate between issues which have to be led by an instructor and issues which may be delivered through interactive simulation training devices and/or covered by web-based elements. Overall time of the course will be allocated accordingly.

i) The maximum number of training hours per day for the theoretical element of type training should not be more than 6 hours. A training hour means 60 minutes of tuition excluding any

breaks, examination, revision, preparation, and aircraft visit. In exceptional cases, the competent authority may allow deviation from this standard when it is properly justified that the proposed number of hours follows pedagogical and human factors principles. These principles are especially important in those cases where:

- Theoretical and practical training are performed at the same time;
- Training and normal maintenance duty / apprenticeship are performed at the same time.

j) The minimum participation time in order for the trainee to meet the objectives of the course should not be less than 90 % of the tuition hours, or 95 % completion of the content in case of student-centred methods in a theoretical training course. Additional training may be provided by the training organisation in order to meet the minimum participation time. If the minimum participation defined for the course is not met, a certificate of recognition should not be issued

k) The TNA is a living process and should be reviewed/updated based on operation feedback, maintenance occurrences, airworthiness directives, major service bulletins impacting maintenance activities or requiring new competencies for mechanics, alert service bulletins, feedback from trainees or customer satisfaction, evolution of the maintenance documentation such as MRBs, MPDs, MMs, etc. The frequency at which the TNA should be reviewed/updated is left to the discretion of the organisation conducting the course.

NOTE: The examination is not part of the TNA. However, it should be prepared in accordance with the learning objectives described in the TNA.

AMC1 Appendix III Aircraft type training and type evaluation standard — on-the-job training (OJT) Section 4.1

Type training examination and assessment standard

4.1 Theoretical element examination standard

Examinations may be computer or paper based, or a combination of both.

AMC to Section 5.0 of Appendix III to AMEL Manual

"Aircraft Type Training and Examination Standard. On-the-Job Training"

Type Examination Standard

This Section 5 "Type Examination Standard" does not apply to the examination performed as part of type training. This Section only applies to those cases where type examination is performed as a substitute for type training.

AMC to Section 6.0 of Appendix III to AMEL Manual

"Aircraft Type Training and Type Evaluation Standard. On-the-Job Training (OJT)"

On-the-Job Training (OJT)

General

1. "A maintenance organisation appropriately approved for the maintenance of the particular aircraft type" means an approved maintenance organisation holding a rating for such aircraft.
2. The OJT may be split in several parts and carried out at different AMOs, also combining line and base facilities from the same or different organisations. The organisation at which the final assessment is carried out, should control and coordinate the OJT activities and have the responsibility for the entire OJT programme. The procedures for the OJT should be included in the Maintenance Procedures Manual of the approved maintenance organisation.
3. The OJT should include one to one supervision and should involve actual work task performance on aircraft/components, covering line and/or base maintenance tasks.
4. 'Skills and responsibilities of a typical certifying staff' include but are not limited to:

-understanding the importance of professional integrity, behaviour and having an appropriate attitude towards safety;
-understanding the conditions for ensuring the continuing airworthiness of aircraft and components;
-the ability to identify and rectify existing and potential unsafe conditions;
-the ability to prioritise tasks, coordinate with a team, and report discrepancies;
-the ability to determine the required qualifications for the performance of maintenance tasks;
-the ability to confirm the proper accomplishment of maintenance tasks;
-the ability to compile and control completed work cards;
-knowledge of safety risks linked to a particular working environment;
-understanding of human performance and limitations;
-understanding of the AMO's (where the OJT is performed) privileges and limitations;
-understanding of the AMO's personnel authorisations and limitations;
-being familiar with the AMO's documents/forms (work packages, work orders, work cards, etc.);
-being familiar with AMO's release-to-service procedures: use of the aircraft technical logbook (ATLB), deferral of items and dispatch under MEL/CDL;
-access, use and control of the required tools and equipment; − access, use and control of the required ICAs (AMM, TSM, SRM, etc.)

OJT content and OJT logbook

If the aircraft manufacturer has defined the OJT tasks during the type certification of a particular aircraft type (e.g. the operational suitability data (OSD) has been approved for a particular aircraft type), those tasks should be selected. In particular, the analysis performed for the maintenance areas of

specific emphasis (MASE), as defined in CS-MCSD, helps the organisation identify the more appropriate tasks.

Where no such data exists, the task list in Appendix II to the AMEL serves as the basis to develop an OJT programme including the applicable tasks for a particular aircraft type, based typically on the AMM. The tasks may be selected from the table in Appendix II in order to cover a broader representative sample of both simple and complex tasks on the particular aircraft type in order to reach a balanced distribution of the tasks between line and base maintenance. The tasks should be selected among those that are applicable to the aircraft type and the licence (sub)category applied for; for example, the selection could exclude location tasks (LOC) and tasks that can be considered under the category A licence privileges (seat covers, boilers, wheels, etc.).
A minimum number of tasks, as described in point 2 'List of tasks for OJT' of Appendix II, of each of the following categories should be performed: INS/inspections, FOT/functional or operational, SGH/servicing, R/I removal and installation, MEL, and T/S troubleshooting. The licensing authority may accept that a limited number of tasks is not performed as long as the relevant cross section of the tasks as regards quality, quantity and complexity is still assured.
A task may be performed on the analogous system installed on a different aircraft type when the systems
are similar in terms of design architecture, technology, and functionality. This can be the case, for example, for tasks performed on engines or landing gear of aircraft of the same manufacturer. Such task should be clearly identified and recorded.
Certain maintenance tasks could be performed on non-airworthy aircraft that still maintain functionality of systems to the extent that the maintenance tasks can be completely performed without any deviation from the maintenance instructions. Tasks circumscribed to system components may be performed at the workshop. This can be the case, for example, for avionics functional tests. Such scenarios should be limited to specific tasks that may not occur often in the maintenance of operational aircraft.

The use of MSTDs and MTDs for OJT should be restricted to a minimum.

When an existing licence is changed to include an additional category with a type rating, a different OJT from the category held to the new one may be permissible. In those cases, only tasks corresponding to the differences between the two categories should be performed.

The organisation that has control over the OJT should provide candidates with a schedule or plan which indicates the list of tasks to be performed under supervision. A record of the completed tasks is to be entered into a logbook whose design and format should be such that each task or group of tasks is countersigned by the corresponding mentor(s). Regarding day-to-day supervision of the OJT programme in the approved maintenance organisation and the role of the mentor(s), the following should be considered:

- It is sufficient for the completion of the individual OJT tasks to be confirmed by the direct mentor(s), without the direct evaluation of the assessor being necessary.
- During the day-to-day OJT performance, the aim of the supervision is for mentors to oversee the whole process, including task completion, use of manuals, adherence to procedures, observance of safety measures, warnings, cautions and recommendations, and demonstration of appropriate behaviour in the maintenance environment.
- The mentor(s) should personally observe the work being performed to ensure its safe completion, and should be readily available for consultation if needed during the OJT.
- The mentor(s) should sign the tasks and release the maintenance tasks as the candidate is still not qualified to do so.
- The mentor(s) should be designated by the approved maintenance organisation to supervise.

For training in release-to-service procedures, following the completion of the performance of a specific task chosen by the mentor, the candidate should prepare a document with simulated release to service which has to be marked as 'for training purposes only' (e.g. ATL page, maintenance task card, CRS). If both the task and the simulated release to service have been performed to the satisfaction of the mentor, the task may be countersigned in the OJT task list by the mentor. A physical or electronic copy of the document with simulated release should be added to the syllabus.
Tasks which are usually performed with more than one person may be performed by more than one candidate under the supervision of one mentor. During the performance of the tasks, the mentor is limited to overseeing three candidates at the same time, given that the candidates can be properly seen 'at a glance' from the mentor's position. Those tasks should be marked as 'group tasks' when applying for the approval. All other tasks should be a one-to-one mentorship. In such cases, all the candidates involved should be noted on the work order.
At the end of the performance of the OJT, a compliance report shall be made which verifies and documents the correct and complete performance and the recommendation of the mentor(s) for the following assessment. The mentor(s) may deny a recommendation if the candidate has not demonstrated the knowledge, skills, behaviour and/or ethics required from certifying staff.

Final assessment of the applicant
The OJT assessment should consist of a theoretical part and a practical part.
The theoretical part comprises the regulatory framework, safety procedures, knowledge of aircraft and its systems, maintenance procedures, and other typical certifying staff activities such as:

- the review and acceptance of work orders;
- shift-handover procedures and team coordination;
- communication and interaction with the flight crew;
- dispatch with unserviceable items;
- clear aircraft logbook entries and reporting notes;
- checks before release to service.

The practical part should include maintenance tasks on the aircraft (e.g. rem./inst., TS, R/I, FOT, MEL dispatch). The assessor may decide to simulate some aspects of the maintenance tasks

The aircraft type on which the OJT is performed needs to be available for the assessment together with access to the required maintenance data, equipment, and tools. A training aircraft may be acceptable. It is good practice to assess the practical skills on the aircraft in question while the assessment of knowledge may be performed either on the aircraft or in theory.

Further guidance about the designated assessors is provided in the AMC to Appendix III to AMEL.

If an independent observer is required for the OJT, they shall be selected by the maintenance organisation among the maintenance personnel that have not taken part in the OJT performance but do have an adequate understanding of the OJT procedures.

Appendix IV
Experience Requirements for Extending an Aircraft Maintenance Engineers' Licence

The table below shows the experience requirements for adding a new category or subcategory on an existing AME Licence.
The experience shall be practical maintenance experience on operating aircraft in the subcategory relevant to the application.
The experience requirement will be reduced by 50 % if the applicant has completed an approved training organization course relevant to the subcategory.

To From	A1	A2	A3	A4	B1.1	B1.2	B1.3	B1.4	B2	B3
A1	-	6 months	6 months	6 months	2 years	6 months	2 years	1 year	2 years	6
A2	6 months	-	6 months	6 months	2 years	6 months	2 years	1 year	2 years	6
A3	6 months	6 months	-	6 months	2 years	1 year	2 years	6 months	2 years	6
A4	6 months	6 months	6 months	-	2 years	1 year	2 years	6 months	2 years	1 year
B1.1	None	6 months	6 months	6 months	-	6 months	6 months	6 months	1 year	1 year
B1.2	6 months	None	6 months	6 months	2 years	-	2 years	6 months	2 years	
B1.3	6 months	6 months	None	6 months	6 months	6 months	-	6 months	1 year	1 year
B1.4	6 months	6 months	6 months	None	2 years	6 months	2 years	-	2 years	
B2	6 months	6 months	6 months	6 months	1 year	1 year	1 year	1 year	-	6
B3	6 months	None	6 months	6 months	2 years	6 months	2 years	1 year	2 years	-

Appendix V

Application Form – TCAA-FRM-SR-PEL075

1. Form: AC-PEL013 is used for application f o r the Aircraft Maintenance Engineers' Licence referred to in this Manual.
2. Kindly visit TCAA website http://www.tcaa.go.tz to download the latest version

Appendix VI

Aircraft Maintenance Engineers' licence

1. An example of the Aircraft Maintenance Engineers' Licence referred to in AMEL Manual can be found on the following pages.

2. The document shall be printed in the standardised form shown but may be reduced in size to accommodate its computer generation if desired. When the size is reduced care should be exercised to ensure sufficient space is available in those places where official seals/stamps are required. Computer generated documents need not have all the boxes incorporated when any such box remains blank so long as the document can clearly be recognised as an Aircraft Maintenance Engineers' Licence issued in accordance with AMEL Manual.

3. The document may be bilingual provided one of the languages is English.

4. Each licence holder shall have a unique licence holder number, established on the basis of a national identifier and an alpha-numeric Four (04) digit designator.

5. The document may have the pages in any order and need not have some or any divider lines as long as the information contained is positioned such that each page layout can clearly be identified with the format of the example of the aircraft maintenance licence contained herein.

6. The document shall be prepared and issued by the Authority.

7. Any change to an existing Aircraft Maintenance Engineers' Licence may be carried out by the Authority.

8. The Aircraft Maintenance Engineers' Licence once issued is required to be kept by the person to whom it applies in good condition and who shall remain accountable for ensuring that no unauthorised entries are made.

9. Failure to comply with paragraph 8 may invalidate the document and could lead to the holder not being permitted to hold any certification privileges and may result in prosecution under TCAA applicable regulations and enforcement Procedure.

10. The licence shall clearly indicate that the limitations are exclusions from the certification privileges. If there are no limitations applicable, the LIMITATIONS page will be issued stating 'No limitations.

Section D
Appendices to AMC
Appendix I -Aircraft Type Ratings - Aircraft Maintenance Engineers' Licence

The following aircraft type ratings listed in the table below may be used by the Authority to ensure a common standard.

Notes on TR endorsement covering several models/variants:

The endorsement of a type rating (TR) on the Aircraft Maintenance Engineer's License (AMEL), covering several models/variants, does not automatically imply that the AMEL holder has acquired the appropriate knowledge on each model/variant. The TR course received or the experience the AMEL holder has gained, may have been limited to one or several model(s)/variant(s) but not to all models/variants.

To demonstrate adequate competence on the relevant model(s)/variant(s), the AMEL holder and/or the maintenance organisation where the AMEL holder is contracted/employed, are responsible to verify whether the model/variant has been adequately covered by the TR course or gained experience.

Further explanation can be found in AMC AMEL.A.20(b)3 and the Civil

Aviation (AMO) regulations

Notes on when the licences should be amended:

- When an amendment is introduced by this Manual to an aircraft type rating or to an engine designation in the rating which affect licences already issued, the ratings on the Aircraft Maintenance Engineers' Licences (AMELs) may be amended at the next renewal or when the licence is re-issued, unless there is an urgent reason to amend modify the licence.

Notes on aircraft modified by Supplemental Type Certificate (STC):

- It is not the intention of this manual to include all aircraft modified by STCs.
- When an aircraft has been modified by an STC for installation of another engine, the AMEL Manual type rating of this aircraft may change i.e., from Group 2 to Group 1. This is not reflected in this manual.

  Note: *In case the applicant to a licence faces such a case, he/she can inform the CAA and a new type rating will be defined by the Authority.*

In the following tables:

- The column "TC Holder" includes the TC holder as defined in the type certificate data sheets (TCDS) (EASA, FAA or other) or the Specific Airworthiness Specifications (SAS).
- The column 'STC Holder' includes the STC holder as defined in the supplemental type certificate data sheets (STCDS) (EASA, FAA or other).
- Some TC holders' designations have been corrected to add the information: 'Aircraft with an SAS', this means that the aircraft listed under this TC holder designation is considered an 'orphan aircraft'.
- In Group 3, a third column has been added which is called 'Type of structure' and which intends to assist in identifying the experience required for this type with a view on removing existing limitations on the licence.
- Wooden structure covered with fabric is considered to fall under wooden structure. For Aeroplanes with a combination of structures; e.g., metal tubing fuselage and wooden wings, both experience 'metal tube covered with fabric' and 'wooden structure' are required.
- In Group 3, the column 'MTOM' intends to assist the Authority in identifying the aeroplanes types where the maximum certificated take-off mass (MTOM) is:
  - above 2T and is subject to a B1.2 licence, or
  - 2T and below and is subject to a B1.2 licence or B3 Licence

Appendix I List of Aircraft Type Ratings

Refer to TCAA website (www.tcaa.go.tz) for the list of aircraft in group 1, 2, 3 and 4

Appendix II
Aircraft Type Practical Experience and On-the-Job Training
List of Tasks

A. SPECIFIC TASKS FOR AEROPLANES AND HELICOPTERS

Time limits/Maintenance checks

- ✓ 100-hour check (general aviation aircraft).

- ✓ "B" or "C" check (transport category aircraft).
- ✓ Assist carrying out a scheduled maintenance check i.a.w. AMM. Review Aircraft maintenance log for correct completion.
- ✓ Review records for compliance with Airworthiness Directives. Review records for compliance with component life limits. Procedure for inspection following heavy landing. Procedure for inspection following lightning strike.

Dimensions/Areas
Locate component(s) by zone/station number.
Perform symmetry check.

Lifting and Shoring
Assist in:
Jack aircraft nose or tail wheel. Jack complete aircraft.
Sling or trestle major component.

Levelling/Weighing
Level aircraft.
Weigh aircraft.
Prepare weight and balance amendment.
Check aircraft against equipment list.

Towing and Taxiing
Prepare for aircraft towing.
Tow aircraft.
Be part of aircraft towing team.

Parking and mooring
Tie down aircraft.
Park, secure and cover aircraft.
Position aircraft in dock.
Secure rotor blades.

Placards and Markings
Check aircraft for correct placards.
Check aircraft for correct markings.

Servicing
Refuel aircraft.
Defuel aircraft.
Carry out tank to tank fuel transfer.

Check/adjust tire pressures.
Check/replenish oil level.
Check/replenish hydraulic fluid level.
Check/replenish accumulator pressure.
Charge pneumatic system.
Grease aircraft.
Connect ground power.
Service toilet/water system.
Perform pre-flight/daily check.

Vibration and Noise Analysis
Analyse helicopter vibration problem.
Analyse noise spectrum.
Analyse engine vibration.

Air Conditioning
Replace combustion heater.
Replace flow control valve.
Replace outflow valve.
Replace safety valve.
Replace vapour cycle unit.
Replace air cycle unit.
Replace cabin blower.
Replace heat exchanger.
Replace pressurisation controller.
Clean outflow valves.
Deactivate/reactivate cargo isolation valve.
Deactivate/reactivate avionics ventilation components.
Check operation of air conditioning/heating system.
Check operation of pressurisation system.
Troubleshoot faulty system.

Auto flight
Install servos. Rig bridle cables.
Replace controller.
Replace amplifier.
Replacement of the auto flight system LRUs in case of fly-by-wire aircraft.
Check operation of auto-pilot.
Check operation of auto-throttle/auto-thrust.
Check operation of yaw damper.
Check and adjust servo clutch.
Perform autopilot gain adjustments.

Perform mach trim functional check.
Troubleshoot faulty system.
Check autoland system.
Check flight management systems.
Check stability augmentation system.

Communications
Replace VHF com unit.
Replace HF com unit.
Replace existing antenna.
Replace static discharge wicks.
Check operation of radios.
Perform antenna VSWR check.
Perform Selcal operational check.
Perform operational check of passenger address system.
Functionally check audio integrating system.
Repair co-axial cable.
Troubleshoot faulty system.

Electrical Power
Charge lead/acid battery.
Charge Ni-Cad battery.
Check battery capacity.
Deep-cycle Ni-Cad battery.
Replace integrated drive/generator/alternator.
Replace switches.
Replace circuit breakers.
Adjust voltage regulator.
Change voltage regulator.
Amend electrical load analysis report.
Repair/replace electrical feeder cable.
Troubleshoot faulty system.
Perform functional check of integrated drive/generator/alternator.
Perform functional check of voltage regulator.
Perform functional check of emergency generation system.

Equipment/Furnishings
Replace carpets
Replace crew seats.
Replace passenger seats.
Check inertia reels.
Check seats/belts for security.
Check emergency equipment.

Check ELT for compliance with regulations.
Repair toilet waste container.
Remove and install ceiling and sidewall panels.
Repair upholstery.
Change cabin configuration.
Replace cargo loading system actuator.
Test cargo loading system.
Replace escape slides/ropes.

Fire protection
Check fire bottle contents.
Check/test operation of fire/smoke detection and warning system.
Check cabin fire extinguisher contents.
Check lavatory smoke detector system.
Check cargo panel sealing.
Install new fire bottle.
Replace fire bottle squib.
Troubleshoot faulty system.
Inspect engine fire wire detection systems.

Flight Controls
Inspect primary flight controls and related components i.a.w.
AMM. Extending/retracting flaps & slats.
Replace horizontal stabiliser.
Replace spoiler/lift damper.
Replace elevator.
Deactivation/reactivation of aileron servo control.
Replace aileron.
Replace rudder.
Replace trim tabs.
Install control cable and fittings.
Replace slats.
Replace flaps.
Replace powered flying control unit.
Replace flat actuator.
Rig primary flight controls.
Adjust trim tab.
Adjust control cable tension.
Check control range and direction of movement.
Check for correct assembly and locking.
Troubleshoot faulty system.
Functional test of primary flight controls.

Functional test of flap system.
Operational test of the side stick assembly.
Operational test of the THS.
THS system wear check.

Fuel
Water drain system (operation).
Replace booster pump.
Replace fuel selector.
Replace fuel tank cells.
Replace/test fuel control valves.
Replace magnetic fuel level indicators.
Replace water drain valve.
Check/calculate fuel contents manually.
Check filters.
Flow check system.
Check calibration of fuel quantity gauges.
Check operation feed/selectors.
Check operation of fuel dump/jettison system.
Fuel transfer between tanks.
Pressure defuel.
Pressure refuel (manual control).
Deactivation/reactivation of the fuel valves (transfer defuel, X-feed, refuel).
Troubleshoot faulty system.

Hydraulics
Replace engine driven pump.
Check/replace case drain filter.
Replace standby pump.
Replace hydraulic motor pump/generator.
Replace accumulator.
Check operation of shut off valve.
Check filters/clog indicators.
Check indicating systems.
Perform functional checks.
Pressurisation/depressurisation of the hydraulic system.
Power Transfer Unit (PTU) operation.
Replacement of PTU.
Troubleshoot faulty system.

Ice and rain protection
Replace pump. Replace timer.

Inspect repair propeller deice boot.
Test propeller de-icing system.
Inspect/test wing leading edge de-icer boot.
Replace anti-ice/deice valve.
Install wiper motor.
Check operation of systems.
Operational test of the pitot-probe ice protection.
Operational test of the TAT ice protection.
Operational test of the wing ice protection system.
Assistance to the operational test of the engine air-intake ice protection (with engines operating).
Troubleshoot faulty system.

Indicating/recording systems
Replace flight data recorder.
Replace cockpit voice recorder.
Replace clock.
Replace master caution unit.
Replace FDR.
Perform FDR data retrieval. Troubleshoot faulty system. Implement ESDS procedures. Inspect for HIRF requirements. Start/stop EIS procedure.
Bite test of the CFDIU.
Ground scanning of the central warning system.

Landing Gear
Build up wheel. Replace main wheel.
Replace nose wheel. Replace steering actuator.
Replace truck tilt actuator.
Replace gear retraction actuator.
Replace uplock/downlock assembly.
Replace shimmy damper.
Rig nose wheel steering.
Functional test of the nose wheel steering system.
Replace shock strut seals.
Replace brake unit.
Replace brake control valve.
Bleed brakes. Replace brake fan.
Test anti skid unit.
Test gear retraction.
Change bungees.
Adjust micro switches/sensors.
Charge struts with oil and air.
Troubleshoot faulty system.

Test auto-brake system.
Replace rotorcraft skids.
Replace rotorcraft skid shoes.
Pack and check floats.
Flotation equipment.
Check/test emergency blowdown (emergency landing gear extension).
Operational test of the landing gear doors.

Lights
Repair/replace rotating beacon.
Repair/replace landing lights.
Repair/replace navigation lights.
Repair/replace interior lights.
Replace ice inspection lights.
Repair/replace logo lights.
Repair/replace emergency lighting system.
Perform emergency lighting system checks.
Troubleshoot faulty system

Navigation
Calibrate magnetic direction indicator.
Replace airspeed indicator.
Replace altimeter.
Replace air data computer.
Replace VOR unit.
Replace
ADI.
Replace HSI.
Check pitot static system for leaks.
Check operation of directional gyro.
Functional check weather radar.
Functional check doppler.
Functional check TCAS.3
Functional check DME.
Functional check ATC Transponder
Functional check flight director system.
Functional check inertial nav system.
Complete quadrantal error correction of ADF system.
Update flight management system database.
Check calibration of pitot static instruments.
Check calibration of pressure altitude reporting system.
Troubleshoot faulty system.

Check marker systems.
Compass replacement direct/indirect.
Check Satcom.
Check
GPS. Test
AVM.

Oxygen
Inspect on board oxygen equipment.
Purge and recharge oxygen system.
Replace regulator.
Replace oxygen generator.
Test crew oxygen system.
Perform auto oxygen system deployment check.
Troubleshoot faulty system.

Pneumatic systems
Replace filter.
Replace air shut off valve.
Replace pressure regulating valve.
Replace compressor.
Recharge desiccator.
Adjust regulator.
Check for leaks.
Troubleshoot faulty system.

Vacuum systems
Inspect the vacuum system i.a.w. AMM.
Replace vacuum pump.
Check/replace filters.
Adjust regulator.
Troubleshoot faulty system.

Water/Waste
Replace water pump.
Replace tap.
Replace toilet pump.
Perform water heater functional check.
Troubleshoot faulty system.
Inspect waste bin flap closure.

Central Maintenance System
Retrieve data from CMU.
Replace CMU.
Perform Bite check.
Troubleshoot faulty system.

Airborne Auxiliary power
Install APU.
Inspect hot section.
Troubleshoot faulty system.
Structures
Assessment of damage.
Sheet metal repair.
Fibre glass repair.
Wooden repair.
Fabric repair.
Recover fabric control surface.
Treat corrosion.
Apply protective treatment.

Doors
Inspect passenger door i.a.w. AMM.
Rig/adjust locking mechanism.
Adjust air stair system.
Check operation of emergency exits.
Test door warning system.
Troubleshoot faulty system.
Remove and install passenger door i.a.w. AMM.
Remove and install emergency exit i.a.w. AMM.
Inspect cargo door i.a.w. AMM.

Windows
Replace windshield.
Replace direct vision window.
Replace cabin window.
Repair transparency.

Wings
Skin repair.
Recover fabric wing.
Replace tip.
Replace rib.

Replace integral fuel tank panel.
Check incidence/rig.

Propeller
Assemble prop after transportation.
Replace propeller.
Replace governor.
Adjust governor.
Perform static functional checks.
Check operation during ground run.
Check track.
Check setting of micro switches.
Assessment of blade damage i.a.w. AMM.
Dynamically balance prop.
Troubleshoot faulty system.

Main Rotors
Install rotor assembly.
Replace blades.
Replace damper assembly.
Check track.
Check static balance.
Check dynamic balance.
Troubleshoot.

Rotor Drive
Replace mast.
Replace drive coupling.
Replace clutch/freewheel unit.
Replace drive belt.
Install main gearbox.
Overhaul main gearbox.
Check gearbox chip detectors.

Tail Rotors
Install rotor assembly.
Replace blades.
Troubleshoot.

Tail Rotor Drive
Replace bevel gearbox.
Replace universal joints.

Overhaul bevel gearbox.
Install drive assembly.
Check chip detectors.
Check/install bearings and hangers.
Check/service/assemble flexible couplings.
Check alignment of drive shafts.
Install and rig drive shafts.

Rotorcraft flight controls

Install swash plate. Install mixing box.
Adjust pitch links.
Rig collective system.
Rig cyclic system.
Rig anti-torque system.
Check controls for assembly and locking.
Check controls for operation and sense.
Troubleshoot faulty system.

Power Plant

Build up ECU. Replace engine.
Repair cooling baffles. Repair cowling.
Adjust cowl flaps. Repair faulty wiring.
Troubleshoot.
Assist in dry motoring check. Assist in wet motoring check.
Assist in engine start (manual mode).

Piston Engines

Remove/install reduction gear.
Check tappet clearance.
Check compression.
Extract broken stud.
Install helicoil.
Perform ground run.
Establish/check reference
RPM.
Troubleshoot.

Turbine Engines

Replace module. Replace fan blade.
Hot section inspection/boroscope check.
Carry out engine/compressor wash.
Carry out engine dry cycle.
Engine ground run.

Establish reference power.
Trend monitoring/gas path analysis.
Troubleshoot.

Fuel and control, piston
Replace engine driven pump.
Adjust AMC.
Adjust ABC.
Install carburettor/injector.
Adjust carburettor/injector.
Clean injector nozzles.
Replace primer line.
Check carburettor float setting.
Troubleshoot faulty system.

Fuel and control, turbine
Replace FCU.
Replace Engine Electronic Control Unit (FADEC).
Replace Fuel Metering Unit (FADEC).
Replace engine driven pump.
Clean/test fuel nozzles.
Clean/replace filters.
Adjust FCU.
Troubleshoot faulty system.
Functional test of FADEC.

Ignition systems, piston
Change magneto.
Change ignition vibrator.
Change plugs.
Test plugs.
Check H.T. leads.
Install new leads.
Check timing.
Check system bonding.
Troubleshoot faulty system.

Ignition systems, turbine
Perform functional test of the ignition system.
Check glow plugs/ignitors.
Check H.T. leads.
Check ignition unit.

Replace ignition unit.
Troubleshoot faulty system.

Engine Controls
Rig thrust lever.
Rig RPM control.
Rig mixture HP cock lever.
Rig power lever.
Check control sync (multi-eng).
Check controls for correct assembly and locking.
Check controls for range and direction of movement.
Adjust pedestal micro-switches.
Troubleshoot faulty system.

Engine Indicating
Replace engine instruments(s).
Replace oil temperature bulb.
Replace thermocouples.
Check calibration.
Troubleshoot faulty system.

Exhaust, piston
Replace exhaust gasket.
Inspect welded repair.
Pressure check cabin heater muff.
Troubleshoot faulty system.

Exhaust, turbine
Change jet pipe.
Change shroud assembly.
Install trimmers.
Inspect/replace thrust reverser.
Replace thrust reverser component.
Deactivate/reactivate thrust reverser.
Operational test of the thrust reverser system.

Oil
Change oil. Check filter(s).
Adjust pressure relief valve. Replace oil tank.
Replace oil pump. Replace oil cooler.
Replace firewall shut off valve.
Perform oil dilution test.

Troubleshoot faulty system.

Starting
Replace starter. Replace start relay.
Replace start control valve.
Check cranking speed.
Troubleshoot faulty system.

Turbines, piston engines
Replace PRT.
Replace turbo-blower.
Replace heat shields.
Replace waste gate.
Adjust density controller.

Engine water injection
Replace water/methanol pump.
Flow check water/methanol system.
Adjust water/methanol control unit.
Check fluid for quality.
Troubleshoot faulty system

Accessory gear boxes
Replace gearbox.
Replace drive shaft.
Inspect magnetic chip detector.

APU
Removal/installation of the APU.
Removal/installation of the inlet guide-vane actuator.
Operational test of the APU emergency shut-down test.
Operational test of the APU.

Appendix III

Evaluation of the competence: Assessment and Assessors

This Appendix applies to the competence assessment performed by the designated assessors (and their qualifications).

1) What does "competence" mean and areas of focus for assessment

The assessment should aim at measuring the competence by evaluating three major factors associated to the learning objectives:

- Knowledge;
- Skills;
- Attitude;

Generally, knowledge is evaluated by examination. The purpose of this document is not to describe the examination process: this material mainly addresses the evaluation of "skills" and "attitude" after training containing practical elements. Nevertheless, the trainee needs to demonstrate to have sufficient knowledge to perform the required tasks.

"Attitude" is indivisible from the "skill" as this greatly contributes to the safe performance of the tasks.

The evaluation of the competence should be based on the learning objectives of the training, in particular:

- The (observable) desired performance. This covers what the trainee is expected to be able to do and how the trainee is expected to behave at the end of the training;
- The (measurable) performance standard that must be attained to confirm the trainee's level of competence in the form of tolerances, constraints, limits, performance rates or qualitative statements; and
- The conditions under which the trainee will demonstrate competence. Conditions consist of the training methods, the environmental, situational, and regulatory factors.

The assessment should focus on the competencies relevant to the aircraft type and its maintenance such as, but not limited to:

- Environment awareness (act safely, apply safety precautions and prevent dangerous situations).
- Systems integration (demonstrate understanding of aircraft systems interaction – identify, describe, explain, plan, execute);
- Knowledge and understanding of areas requiring special emphasis or novelty (areas peculiar to the aircraft type, domains not covered by this manual Appendix I, practical training elements that cannot be imparted through simulation devices, etc.);
- Using reports and indications (the ability to read and interpret);
- Aircraft documentation finding and handling (identify the appropriate aircraft documentation, navigate, execute, and obey the prescribed maintenance procedures).
- Perform maintenance actions (demonstrate safe handling of aircraft, engines, components, and tools);
- Aircraft final/close-up and report (apply close, initiate appropriate actions/follow- up/records of testing, establish and sign maintenance records/logbooks).

2) How to assess

As far as feasible, the objectives of the assessment should be associated with the learning objectives and the passing level; it means that observable criteria should be set in order to measure the performance and should remain as objective as possible.

The general characteristics of effective assessment are: objective, flexible, acceptable, comprehensive, constructive, organized, and thoughtful. At the conclusion, the trainee should have no doubt about what he/she did well, what he/she did poorly and how he/she can improve.

The following is a non-exhaustive list of questions that may be posed to assist assessment:

- What are the success factors for the job?
- What are typical characteristics of a correct behavior for the task?
- What criteria should be observed?
- What level of expertise is expected?
- Is there any standard available?
- What is the pass mark? For example:
  - "Go-no go" situation;
  - How to allocate points? Minimum amount to succeed;
  - "Must know or execute" versus "Good to know or execute" versus "Don't expect the candidate to be an expert".
- Minimum or maximum time to achieve? Use time effectively and efficiently.
- What if the trainee fails? How many times is the trainee allowed to fail?
- When and how should the trainee be prepared for the assessment?
- What proportion of judgment by the instructor out of collaboration with the trainee is needed during the evaluation stage?

The assessment may be:

- Diagnostic (prior to a course), formative (re-orientate the course on areas where there is a need to reinforce) or summative (partial or final evaluation);
- performed task-by-task, as a group of tasks or as a final assessment;

One method might be an initial assessment to be performed by the trainee himself, then discussing areas where the perceptions of the trainee's performance by the assessors differ in order to:

- Develop the self-assessment habits;
- Make the assessment more acceptable and understandable to both parties.

A "box-ticking" exercise would be pointless. Experience has shown that assessment sheets have largely evolved over time into assessment of groups of "skills" because in practice such things eventually detracted from the training and assessment that it was intended to serve: evaluate at a point of time, encourage, and orientate the training needs, improve safety, and ultimately qualify people for their duties.

In addition, many other aspects should be appropriately considered during the assessment process such as stress and environmental conditions, difficulty of the test, history of evaluation (such as tangible progresses or sudden and unexpected poor performance made by the trainee), amount of time necessary to build competence, etc.

All these reasons place more emphasis on the assessor and highlight the function of the organization's approval.

3) Who should assess

In order to qualify, the assessor should:

- Be proficient and have sufficient experience or knowledge in:
  - human performance and safety culture;
  - the aircraft type (necessary to have the certifying staff privileges in case of CRS issuances);
  - training/coaching/testing skills;
  - instructional tools to use;
- Understand the objective and the content of the practical elements of the training that is being assessed;
- Have interpersonal skills to manage the assessment process (professionalism, sincerity, objectivity and neutrality, analysis skills, sense of judgement, flexibility, capability of evaluating the supervisor's or instructor's reports, handling of trainee's reactions to failing assessment with the cultural environment, being constructive, etc.);
- Be ultimately designated by the organisation to carry out the assessment.

The roles may be combined for:

- the assessor and the instructor for the practical elements of the Type Rating Training; or
- the assessor and the supervisor for the On-the-Job Training.

provided that the objectives associated to each role are clearly understood and that the competence and qualification criteria according to the company's procedures are met for both functions. Whenever possible (depending on the size of the organisation), it is recommended to split the roles (two different persons) in order to avoid any conflicts of interests.

When the functions are not combined, the role of each function should be clearly understood.

PART II

General Provisions and the Requirements to render valid an Aircraft Maintenance Engineers' Licence and Ratings

1.0 Conversion and Validation of Foreign AMEL

a. Conversion of Foreign AMEL

The Authority may issue a national license based on a foreign license issued by another Contracting State. A holder of an AMEL issued by a Contracting State may submit his/her licence to the Authority for conversion to a Tanzanian AMEL. The following shall be taken into consideration:

1. The Authority recognizes and accepts the foreign State issuing the AMEL.
2. The AMEL meets ICAO Annex 1 requirements.
3. The issuing State verifies the authenticity and validity of the AMEL.
4. The AMEL must be in the English language or accompanied by an English language translation that has been signed by an official or representative of the foreign authority that issued the license
5. The application for the AMEL should be done as prescribed in AMC AMEL.A.123.

After receiving the application, the Authority will verify and evaluate the application in accordance with AMEL Examination Procedures Manual. The applicant will be required to pass knowledge examination(s) on either or a combination of Air law (Module 10), Human factors (Module 9) or a special AMEL conversion examination depending on what the applicant had passed to get the foreign license.

Upon passing of the examination(s) as will be determined by the Authority, the applicant will be issued with a license and endorsements on the foreign license transferred to the issued license as appropriate.
The Authority may transfer a type rating from a foreign license for AMEL conversion if:

a) The aircraft type is endorsed on a foreign license;
b) That applicant is current on the aircraft type; and
c) The type of aircraft is registered in Tanzania.

b. Foreign Licence Validation Certificate for AMEL

2.0 Method of rendering a foreign licence and ratings valid.

The Authority shall render valid a Foreign Aircraft Maintenance Engineers' Licence and ratings issued by another foreign state as stipulated in the Civil Aviation (Personnel Licencing) Regulations

a) Issuing a suitable authorization which is referred to as Foreign Licence Validation Certificate (FLVC) to be carried with the relevant foreign licence and ratings.
b) Specifying the acceptable privileges of the foreign licence & ratings on the FLVC.
c) Granting validity not beyond the validity of the foreign licence
d) Specifying the condition that the FLVC ceases to be valid if the licence upon which it was issued is suspended or cancelled.

3.0 Validation of Foreign Licenses

The Authority may issue a foreign Licence Validation Certificate on the strength of a foreign Aircraft Maintenance Engineers' Licence if necessary.

4.0 Issue of a Foreign Validation Certificate (FLVC)

A foreign license validation certificate shall be issued to an applicant who provides the following and when the Authority is satisfied that the conditions have been fulfilled:

i) A foreign license valid under the laws of a Contracting State and valid for the privileges requested.
ii) The foreign licence shall have been issued in compliance with the minimum Standards specified in ICAO Annex 1.
iii) Issuing Authority of the foreign licence shall have verified and confirmed the details and the validity of the foreign licence.
iv) Confirmation from the Organisation which employs the licence holder specifying the purpose for which the foreign license is to be validated.
v) An application from the licence holder and supporting documents.
vi) Required regulatory fee for issue

4.1 Conditions for the issue of a Foreign License Validation Certificate

4.1.1 The Authority is satisfied that the foreign license meets or exceeds the standards for the is of a similar license of Tanzania.
4.1.2 The foreign license should be appropriately endorsed and currently valid.
4.1.3 The applicant shall have satisfactorily completed an examination on Aviation Legislation conducted by the Authority and/or demonstrated confirmed aircraft maintenance experience as applicable.
4.1.4 Foreign License Validation Certificate will be issued only when the assignment is of a temporary nature.
4.1.5 The Foreign License Validation Certificate will be issued on receipt of confirmation from the issuing Authority about the validity of the license.

Note: The onus of providing any information required by the Authority for such validation lies with the applicant.

5.0 Validity Period

The period of Validity of the Foreign License Validation Certificate shall be as indicated in the certificate from the date of issue but not beyond the period of validity of the foreign licence.

5.1 Conditions to exercise the privileges

The privileges of the Foreign License Validation Certificate (FLVC) shall be as specified in the Certificate.
During the validity period of the FLVC, the privileges so granted shall not be exercised unless the;

a. holder maintains the validity of the foreign licence by satisfying the requirements of the foreign Licensing Authority: and
b. Holder satisfies the recurrent and/or additional training and checking requirements of the Operator as approved by the Authority.
c. Holder meets the applicable recent experience requirements as set out by the Authority.
d. Foreign licence is not suspended or cancelled.

5.2 Conditions of Validity of a Foreign Licence Validation Certificate

a. A Foreign License Validation Certificate (FLVC) shall become invalid no sooner the holder terminates employment contract with the Organisation on whose behalf the FLVC had been issued.
b. The holder shall exercise the privileges granted, strictly in compliance with the applicable Tanzania Civil Aviation Regulations, as amended from time to time and requirements and procedures published by the Authority
c. An applicant who has previously been denied of a FLVC by the Authority or whose FLVC has been suspended/cancelled for violating the applicable civil aviation Regulations of Tanzania, shall be disqualified for any future licensing privileges
d. Temporary foreign licences shall not be considered for validation action.
e. When exercising the privileges of a FLVC, the holder shall, at all times, be in possession of the foreign licence, issued by the foreign Licensing Authority and the FLVC issued by the Tanzania Civil Aviation Authority in addition to any other document he/she is required to carry in terms of the Tanzania Civil Aviation Regulations.
f. In respect of a foreign licence, which does not carry a photograph of the holder, an applicant for a FLVC shall produce proof of his/her identity by means of valid personnel identification document, which carry the photograph such as a passport issued by a competent authority.

6.0 Verifications of foreign licence and ratings

The Authority shall confirm the validity of the foreign licence & ratings submitted by the applicant from the CAA of the foreign State concerned before issuing the FLVC.

6.1 Supportive Documents

The following supportive documents shall be submitted with the application.

6.1.1 Foreign licence currently valid for the privileges sought under the laws of the state issued the licence and a photocopy.

6.1.2 Initial training records/certificates of types of aircraft(s) and/or engine(s) for which the application relates to and photocopies.

6.1.3 Proof of Experience and photocopies.

6.1.4 Letters from previous employers and photocopies.

6.1.5 Applicable Personnel Licensing Regulations and Standards of the contracting State which issued the Foreign Licence and photocopies if requested.

6.1.6 Copy of the applicants' passport(s).

6.1.7 Certified English language translations of above documents if the originals are not in the English language.

6.1.8 A request letter from the airline which employs the licence holder specifying the purpose for which the foreign license is to be validated.

6.1.9 Any other document as specified by the Authority.

7.0 Suspension, Cancellation & Amendment of a Foreign Licence Validation Certificate

The Authority may suspend, cancel, or amend a FLVC in terms of the provisions of the Civil Aviation (Personnel Licencing) Regulations (As Amended) if the need for such action arises.

PART III

Component and Specialized Maintenance Specialists Authorization

1.0 Introduction

The Authority, under the provisions of Civil Aviation (Personnel Licensing) Regulations may grant an approval/authorization to an applicant for maintenance of an aircraft component or performance of specialised services. The applicant
should be working in an approved Maintenance Organization performing special tasks which include but not limited to welding, non-destructive testing/inspections, composite material maintenance, surface treatment such as; peening, plating, or painting and other unique methods and techniques approved or accepted by the Authority.

2.0 General Requirements

An applicant for an aircraft component and/or aviation specialized maintenance specialist authorization shall;

a. Submit application as specified in AMEL.A.10 of this manual.

b. Only be issued to eligible employees who perform component and specialized maintenance tasks of an Approved Maintenance Organization;

c. Be at least twenty-one (21) years of age;
d. Be able to read, speak, write, and understand the English language and interpret technical reports and maintenance publications and carry out technical discussions in the English language.
e. Be specially qualified to perform maintenance on aircraft components and specialized services appropriate to the job for which the specialist was employed.
f. Be employed for a specific job requiring special qualifications by an approved maintenance organization certificated under the Civil Aviation (Approved Maintenance Organization) Regulations.
g. Be recommended for certification by the specialist's employer, to the satisfaction of the Authority, as able to satisfactorily carry out maintenance of aircraft components or specialized services, appropriate to the job for which the specialist is employed; and

3.0 Training and Experience

Have completed formal training including examinations and assessments both theory and practical acceptable to the Authority and specifically designed to qualify the applicant for the job on which the applicant is to be or employed.

The applicant must have at least eighteen months of practical experience in the procedures, practices, inspection methods, materials, tools, machine tools, and equipment generally used in the maintenance duties of the specific job for which the person is to be employed and certificated.

4.0 Period of Validity

The period of validity of the component and specialized maintenance specialist authorization will be as indicated in the authorization provided that the authorization holder is in the continued employment of the Approved Maintenance Organization and the specialists foreign certificate based on this authorization remain valid as applicable.

5.0 Privileges and Limitations

Below privileges and limitation shall apply to aircraft component and/or aviation specialized maintenance specialist authorization;

1. An applicant for the specialist authorization who is employed by an approved maintenance organization shall be concurrent with the rating applied for or issued to the approved maintenance organization limited to the specific job for which the specialist is employed to perform, supervise, or approve for return to service.
2. At no instance shall an aviation repair Specialist authorization be issued with an airframe and/or powerplant or avionics rating to circumvent the process of obtaining an aircraft maintenance engineer's license.
3. The specialist shall not perform or supervise duties unless he or she understands the current instructions of the employing approved maintenance organization and the instructions for continued airworthiness, which relate to the specific task concerned.

4. A person who holds the specialist authorization shall keep that authorization within the immediate area where the person normally exercises the privileges of the authorization and shall present it for inspection upon the request of the Authority or any other person authorized by the Authority.
5. A holder of the specialist authorization shall surrender the authorization to the Authority when it is suspended, revoked or at the time the holder leaves the employment of the approved maintenance organization.